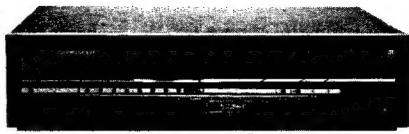




Service Manual

**CIRCUIT DESCRIPTIONS
REPAIR & ADJUSTMENTS**



• PL-V70

**ORDER NO.
ARP-759-0**

STEREO TURNTABLE

PL-V70 (BK)

PL-L90 (BK)

- This service manual is applicable to the PL-V70/KU and PL-L90/KU.
- PL-L90 is the same as the PL-V70 except for exterior design .

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1. SPECIFICATIONS

Motor and Turntable

Drive System	Belt-drive
Motor	DC servo motor
Turntable Platter	aluminum alloy die-cast
Speeds	33-1/3 and 45 rpm
Wow and Flutter	Less than 0.05% (WRMS) ± 0.065% WTD Peak (DIN)
Signal-to-Noise-Ratio	More than 70 dB (DIN-B) (with Pioneer cartridge model PC-291)

Tonearm

Type	Integrated straight pipe arm
------------	------------------------------

PC-291 Specifications

Type	IM type
Stylus	0.5 mil diamond (PN-291)
Output Voltage	2.5 mV (1 kHz, 5 cm/s LAT. Peak)
Tracking Force	1 g to 1.5 g (proper 1.25 g)
Frequency Response	10 to 30,000 Hz
Recommended Load	50 kΩ
Weight	4 g

Subfunctions

Auto lead-in, auto return, auto cut, repeat
 Arm elevation, program search play, manual play,
 Skip, auto disc size selector, record detection,
 Auto speed selector,

Miscellaneous

Power Requirements	AC 120 V, 60 Hz
Power Consumption	11W
Dimensions	420 (W) x 104 (H) x 350 (D) mm 16-1/2 (W) x 4-1/8 (H) x 13-3/4 (D) in.
Weight	7.5 kg/16 lb 8 oz

Accessories

EP Adapter	1
Remote control cord	1
Remote control plate	1
Operating Instructions	1

NOTE:

Specifications and design subject to possible modification without notice, due to improvements.

QUESTIONNAIRE

MODEL _____

One Model per questionnaire

Dear Servicer,

Thank you for your cooperation in the post-sale service of Pioneer products.

This questionnaire is used as a tool to improve the serviceability of our products and service manuals. Please evaluate this model and service manual by answering the following questions. Your ideas may be realized in our future products. Your answers will be appreciated. Thank you.

PIONEER ELECTRONIC CORP.

T. Nakagawa, Manager, Service Section, International Division

1. SERVICING EVALUATION		Circle applicable number:	Good	Fair	Poor
a. Disassembly/Re-assembly:		1	2	3	*4 *5
b. Circuit Checks:		1	2	3	*4 *5
c. Replacement of Parts:		1	2	3	*4 *5
d. Adjustment (s):		1	2	3	*4 *5

* If (4) or (5) was circled, please be specific.

e. Your advice, opinion or ideas related to servicing this product.

2. SERVICE MANUAL EVALUATION

a. Circuit & Mechanism Description

b. Circuit Diagram

3. OTHER

Please describe other areas of servicing which you may find difficult.

Completed by :

Date :

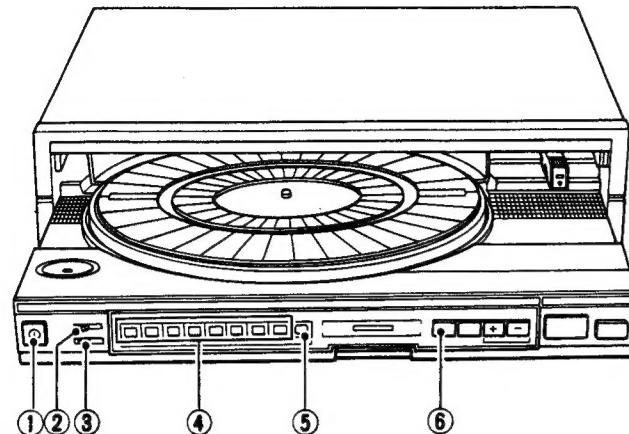
Company Name :

Address :

City/State/Zip :

Please send this form filled to the distributor in your country.

2. FRONT PANEL FACILITIES



① POWER switch/indicator

Press this switch to turn the power on and off.
[ON] (depressed position) : Power is switched ON.
[STAND-BY] (released position) : Power is switched OFF.

② SPEED switch

Set this switch in accordance with the speed of the record to be played.
[AUTO]: Automatically sets rotation speed in accordance with the size of the record: Rotates at 33-1/3 rpm with 30 cm and 25 cm records. Rotates at 45 rpm with 17 cm records.

[33]: Rotates at 33-1/3 rpm
[45]: Rotates at 45 rpm

③ SENSOR switch

Depending on the type of record being played, this switch may be used to adjust the sensitivity at the time of programmed play.

Normally the switch should be left in [NOR] position.

[NOR]: For normal records.

[HI]: For records with very narrow intervals between tracks.

[LO]: For records with wide sound-groove pitch.

④ PROGRAM switches (1 – 8)/indicators

- Press these switches in the desired sequence from [1] through [8] when programming the order in which the tracks are to be played. The tracks are programmed in the order in which the switches are pressed, and auto play or repeat play is performed.
- The numbers [1] through [8] indicate the order of the tracks on the record (for instance, the [2] switch corresponds to the second track). During programmed playback, the program indicator corresponding to the track presently being played will flash.

⑤ CLEAR switch

This switch is pressed in order to clear the program.

⑥ REPEAT switch/indicator

Press this switch so that the indicator lights for repeat play.

⑦ ARM ELEVATION switch (ARM EV)/indicator

- Use the switch for manual play.
- Use the switch to suspend record play temporarily.
- Use the switch when changing the tracks during manual play.

Indicator lights:

The tonearm rises (the stylus moves away from the record).

Indicator flashes:

During right or left movement of the tonearm (or during search for programmed play).

Indicator goes out:

The tonearm descends (the stylus is lowered onto the record).

⑧ LOCATE/SKIP switches (ARM LOCATE/PROGRAM SKIP)

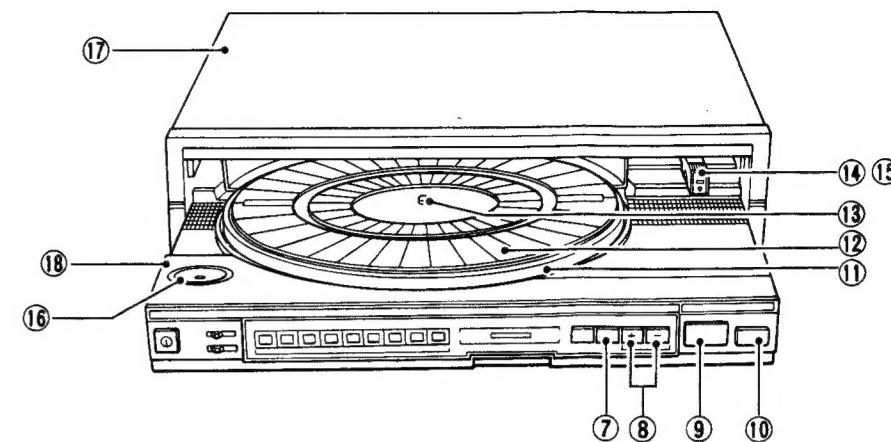
Use these switches to start manual playback, or during playback to change the track being played. When the switches are pressed, the tonearm will move to the right or left (the arm elevation indicator will flash).

[<, +]: Tonearm moves to left. During programmed play, moves to the next programmed track. If pressed multiple times, moves ahead the number of tracks corresponding to the number of times the switch is pressed.

[>, -]: Tonearm moves to right. During programmed play, moves back to the beginning of the track presently being played. If pressed multiple times, moves back the number of tracks corresponding to the number of times the switch is pressed.

NOTE:

When pressing these switches two or more times during programmed play to skip over two or more tracks, do not allow more than about one second to elapse between each press of the switch.



⑨ PLAY/STOP switch

Press this switch when starting auto play or when stopping play.

⑩ EJECT button

Press when mounting or removing a record. When pressed, the slide base comes out to the front.

⑪ Platter

⑫ Platter mat

⑬ Platter shaft

⑭ Tonearm

⑮ Cartridge (PC-291)

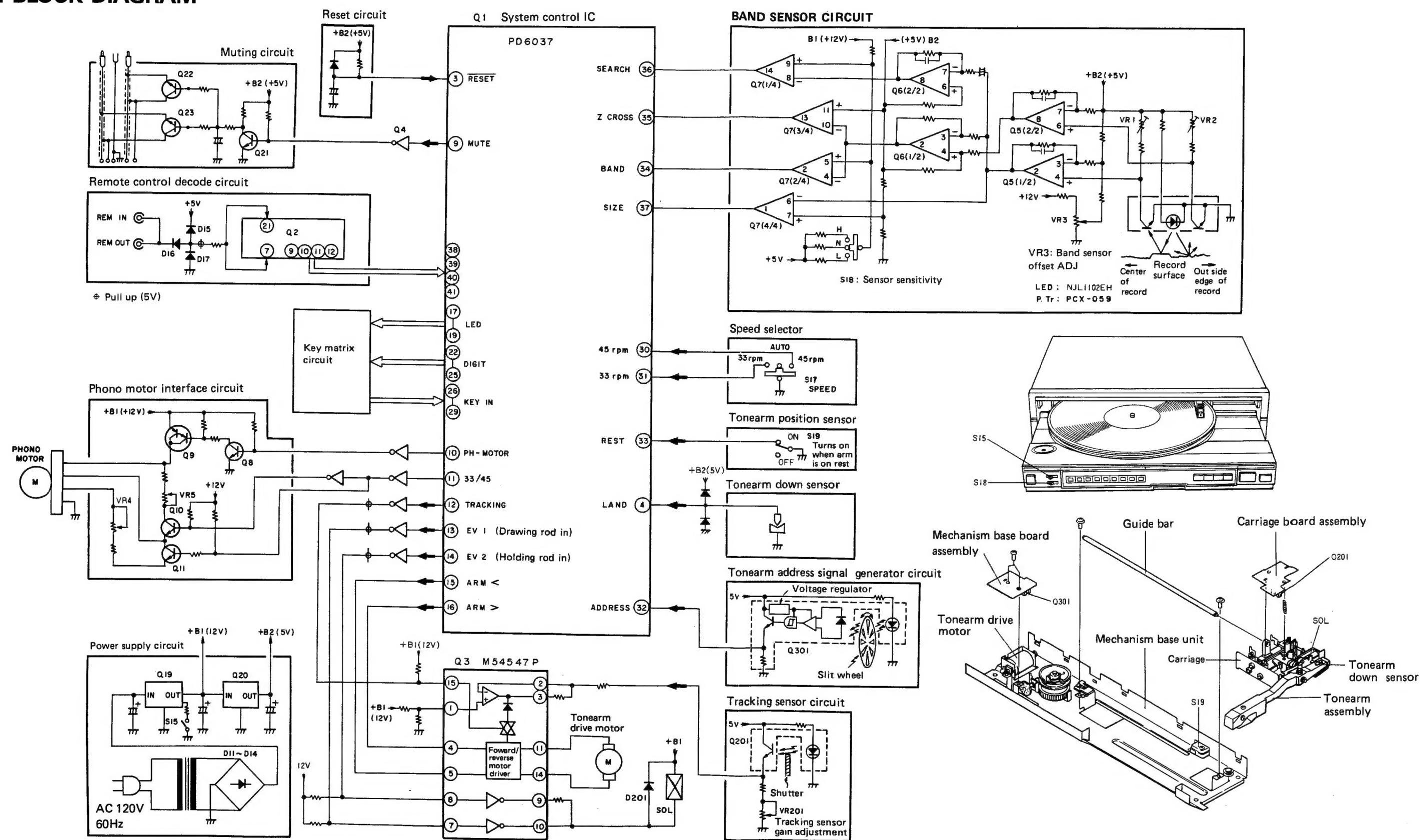
⑯ EP adapter

This is used when playing 45 rpm records with a large center hole.

⑰ Cabinet

⑱ Slide base

3. BLOCK DIAGRAM



4. CIRCUIT DESCRIPTIONS

4.1 CIRCUIT DESCRIPTIONS

4.1.1 Address Sensor Circuit

The address sensor is located on the mechanism base unit. It detects the position of the tonearm and sends address pulses to the control IC as the tonearm moves. The address sensor is made up of an internal Schmitt trigger circuit photo interrupter and a slit wheel which is synchronized with the carriage. The slit wheel spins when the carriage moves and intermittently cuts off light to the photo interrupter (Q301) in pulses which correspond to the carriage movement. These pulses are counted by the control IC, which detects the distance the carriage moves, the tonearm lowering position and the end of the record. It also registers band addresses.

The address pulses from the photo interrupter work as follows: When the light is cut off, the output is "L," and when the light is not cut off the output is "H." One address signal pulse is approximately equivalent to 0.114 mm of tonearm movement.

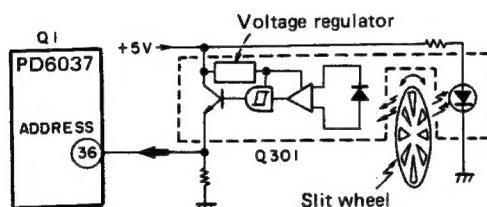


Fig. 4-1 Address Sensor Circuit

4.1.2 Tracking Sensor Circuit

This circuit detects tracking errors by means of a shutter which is synchronized with the tonearm and a photo interrupter.

The tracking sensor is made up of a shutter synchronized with the tonearm and a photo interrupter which is mounted onto the carriage base board. When the tonearm lowers and begins tracing the record surface the tonearm tracking errors increase as the number of rpms increases. When tracking errors increase, the shutter, which is synchronized with the tonearm, also moves and the light cut-off rate of the photo interrupter changes. Subsequently, the output of the photo interrupter changes and is sent to the tonearm drive unit in the form of tracking error signals.

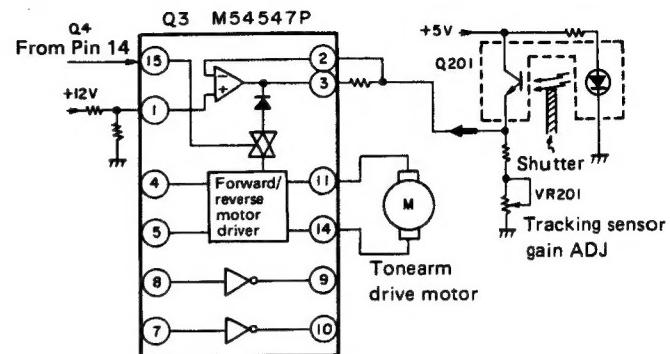


Fig. 4-2 Tracking sensor circuit

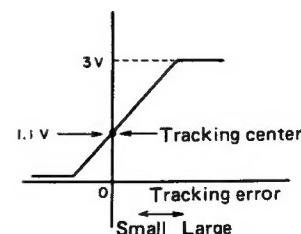
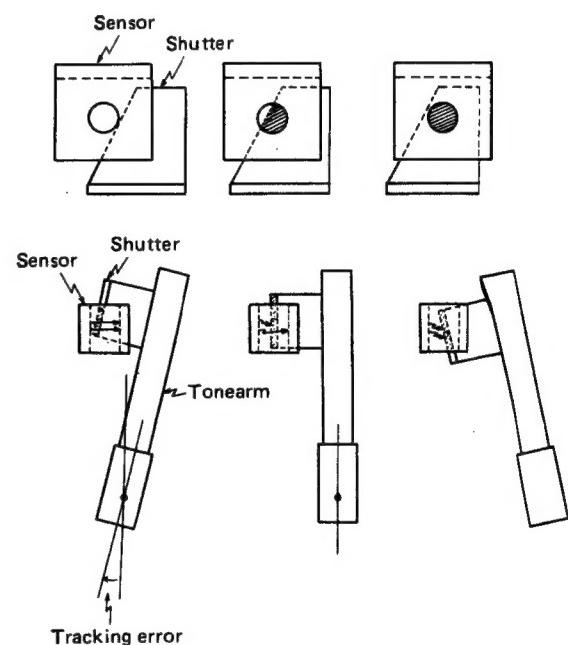


Fig. 4-3 Detection of tracking errors

4.1.3 Band Sensor Circuit

The band sensor circuit detects the size of the record and width of bands by means of a band sensor. It is made up of a band sensor, an amplifier, a differential amplifier, a zero cross comparator, a band comparator, a 30 cm size comparator, an AC amplifier, and a search comparator.

The band sensor itself is made up of an array of 2 phototransistors (PCX-059) mounted into the headshell of the tonearm and an infrared LED (NJL1102EH). It detects, with a light sensor, the different rates of light reflection to determine the difference between a sound groove and a plain band. The output of the band sensor is amplified by each of the amplifiers and applied to the differential amplifier to be transformed into a waveform like that of point C in figure 4-5. From the differential amplifier output, the zero cross comparator detects a band signal (zero cross point), and the band comparator detects signals whose potential is less than Q6 (3/3) pin 8 as band signals.

The output from the band sensor is also applied to the AC amplifier and the 30 cm size comparator.

When in the search mode with the tonearm up, the band sensor output is applied through the AC amplifier (band pass filter configuration) and the search comparator and transformed into the waveform shown in F in figure 4-5. This signal is applied to the control IC to register the plain bands on the record.

The 30 cm size comparator, on receiving the amplified output from the band sensor and detecting reflection from the turntable at the 30-cm lowering position, determines that the record is not a 30-cm record, and sends the signal shown in G in figure 4-5 to the control IC.

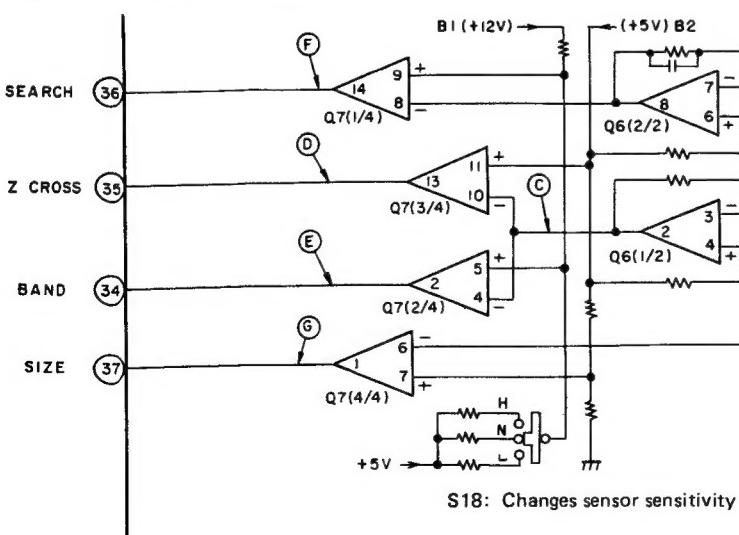


Fig. 4-4 Band Sensor Circuit

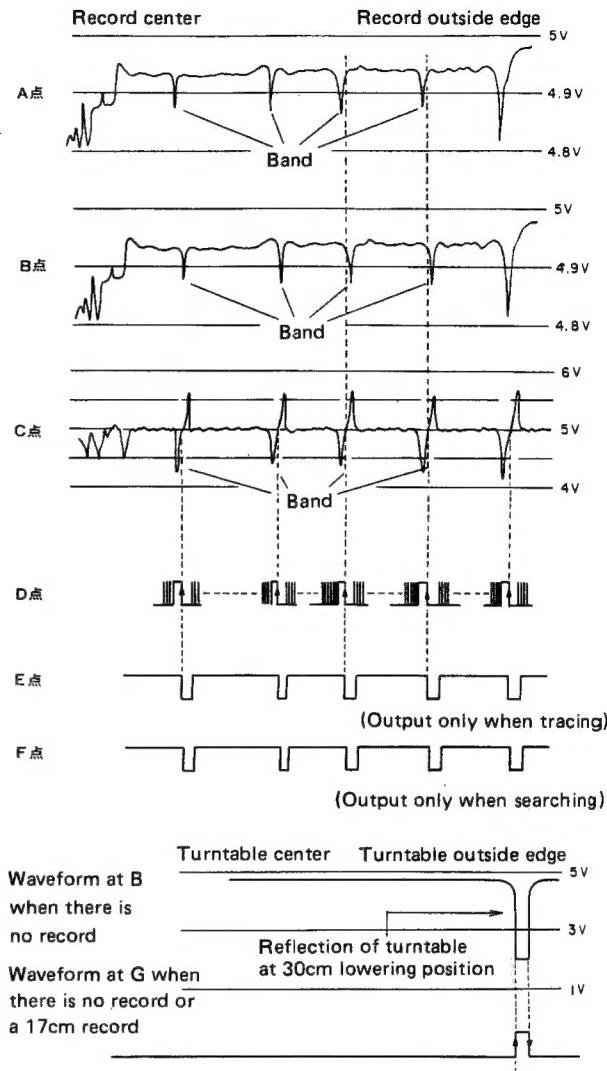
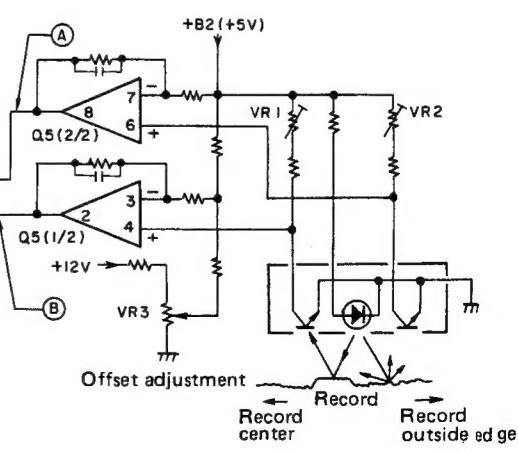


Fig. 4-5 Waveform at Each Point



LED : NJL1102EH
P. Tr : PCX - 059

4.1.4 Elevation and Tonearm Circuits

The tonearm drive motor and EV solenoid are controlled by commands from the control IC (Q1), which also controls the horizontal and vertical movement of the tonearm. In addition to this, the IC controls tonearm tracking with the tracking sensor and tracking error signals.

• EV solenoid drive

The EV solenoid drive uses a large current at first to draw the plunger inside, and thereafter uses a lower current for holding the plunger in.

The signal to draw the plunger inside comes from the control IC (Q1), passes through the Q2 transistor array, and enters Q3 pin 7. This signal turns on the Q3 Darlington transistor, and approximately 170mA of current runs into the collector, turning on the EV solenoid which draws the plunger inside. Because of this, the tonearm will drop slightly. This "draw" signal from the control IC lasts about 1 second. Next, the hold signal, which was output at the same time as the draw signal, passes through the Q2 transistor array, enters Q3 pin 8 and turns on the Darlington transistor. When the draw signal ends, a current of approximately 70mA drawn from pin 9 holds the plunger inside, which keeps the tonearm elevation down until the hold signal ends.

• Tonearm drive

The tonearm drive is controlled by input to Q3 pin 4, pin 5 and pin 15. Their truth values are shown in Fig. 4-6.

• Lead-in (locate-in) <

Q3 receives locate-in signals from the control IC (Q1), and with an output of approximately 0V from Q3 pin 14 (O1) and approximately 11V from pin 11 (O2), the tonearm motor begins turning in the lead-in direction.

• Lead-in (locate-out) >

Q3 receives locate-out signals from the control IC (Q1), and with an output of approximately 11V from pin 14 and approximately 0V from pin 11, the tonearm motor begins turning in the lead-out direction.

• Stop

Q3 receives stop signals from the control IC (Q1), and with an output of approximately 0V from both pin 14 and pin 11, stops the tonearm motor.

• Tracking

Q3 receives tracking signals from the control IC (Q1), and between pin 14 and pin 11, outputs an amplified tracking error signal (amplified by an internal OP amplifier) and begins turning the tonearm drive motor in such a way as to correct the error.

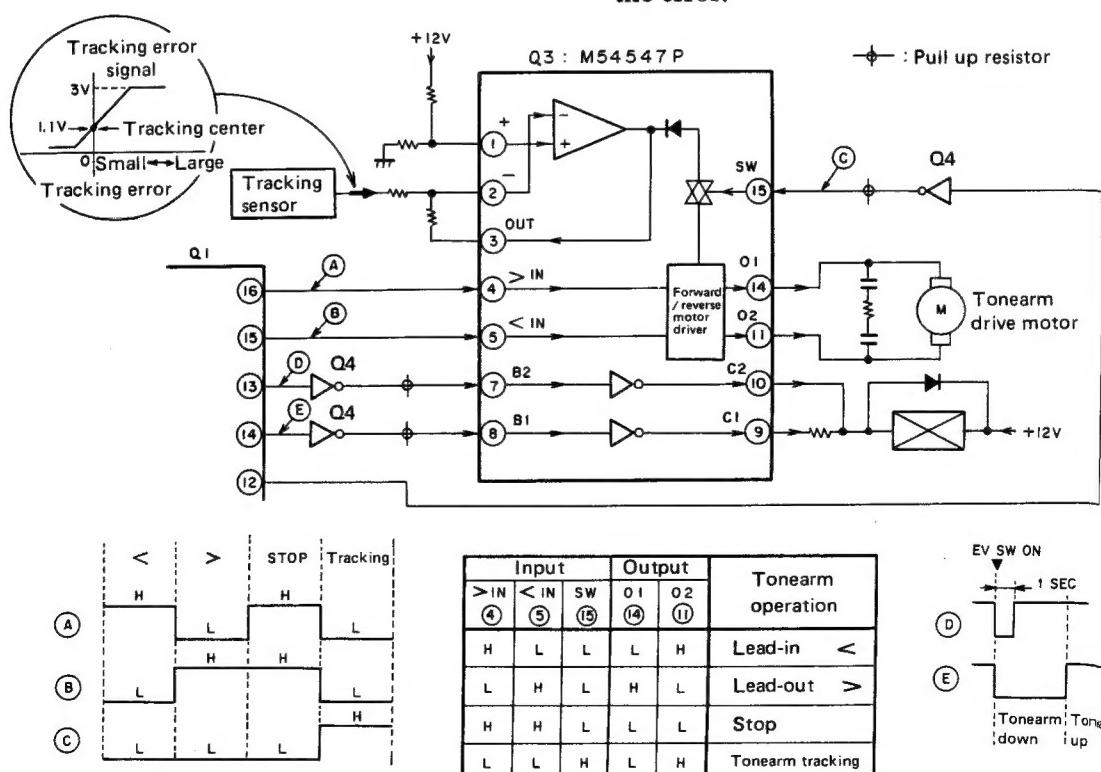


Fig. 4-6 Elevation and Tonearm Drive Circuit and I/O Truth Value Chart

4.1.5 Key Matrix Circuit

The key matrix circuit reads the digit output (pins 22 to 25) of the control IC (Q1) from the Key IN terminal (pins 26 to 29) and distinguishes different key input signals with the control IC. In addition to carrying out key input operations, it

lights LEDs with output from pins 17 to 19. Fig. 4-8 shows the output waves produced by switch matrix input in the following order: REPM SW, Program SW 7, and EV SW.

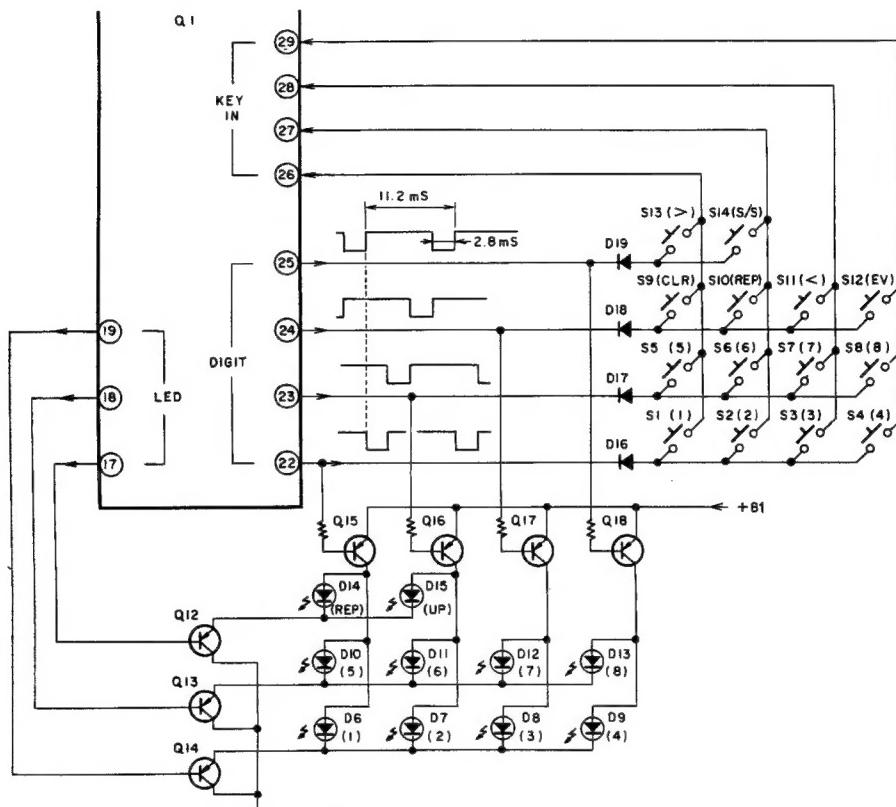


Fig. 4-7 Key Matrix Circuit

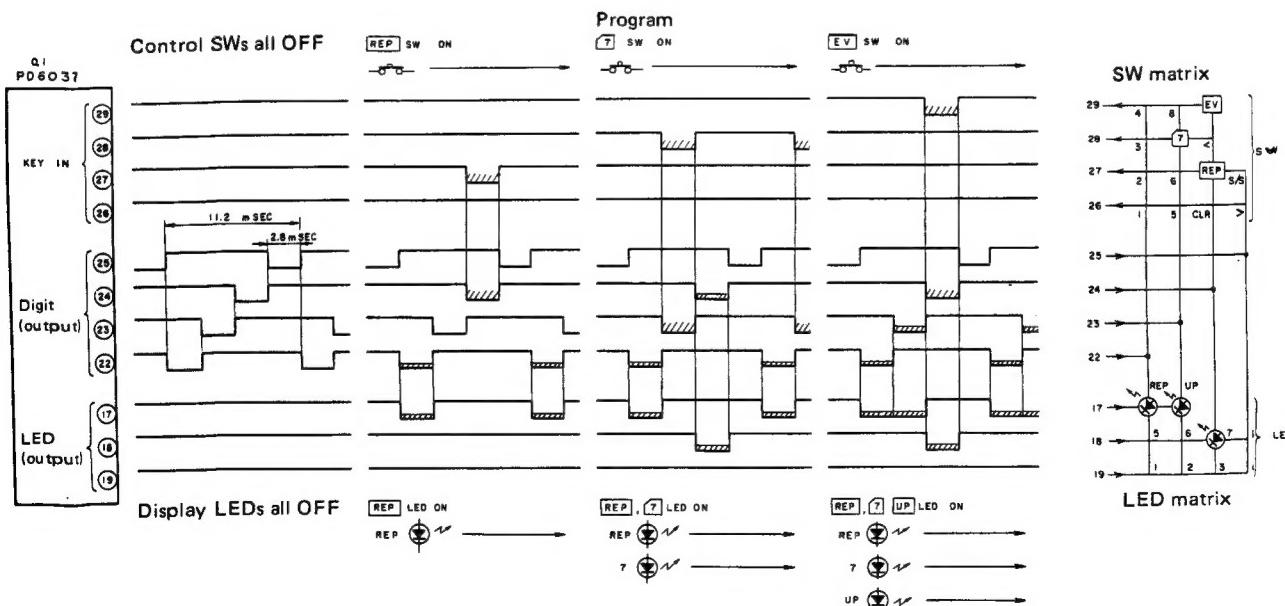


Fig. 4-8 Output Waveforms Produced by Key input

4.1.6 Remote Control Decode Circuit

Remote control signal processing feature

- The SA-V70 receives an infrared remote control signal from the commander, removes the carrier, and sends the resulting signal through an 1P remote control cord to the REM IN terminal of the PL-V70.

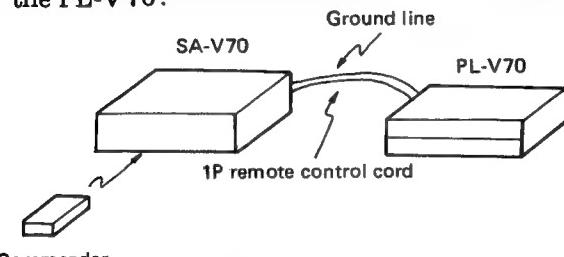


Fig. 4-9 Connection to REM IN

- When a predefined serial signal is input to the REM IN terminal, the operation dictated by the key strokes is performed, and the mechanism and the signal lines are thus controlled.

- Input conditions (Input signal must be without a carrier)
 - The signal format must conform to that of μ PD6102G. (See figure 4-11.)
 - Only when a custom code (component code; A3 for the player) specified for the REM IN terminal is received, shall the unit respond the following control codes (instruction codes).
 - Remote control signals can be received depending on the reception mode (enable/disable) of the main unit. When both a remote control key and a main unit key are pressed at the same time, the main unit key becomes effective.

2. Input processing

- The trailing edge of the input signal at the REM IN terminal is detected.
- The duration of the leader code ("L" level) determines the validity of the leader code. (Approximately 12.3 msec)
- The states ("1" or "0") of the custom and data codes are determined by the width of the data pulses. (0: approx. 1.02 msec; 1: approx. 2.05 msec)

3. Control processing

- When the remote control signal is valid, the unit enters one of the 15 control modes described in figure 4-12.
- The remote control operation must be exactly the same as the operation instructed via the unit's keys.
- Even while the remote operation proceeds, the unit shall keep checking whether the signal is still received at the REM IN terminal. If the signal ceases for 100 msec or more, the unit shall go into the standby mode in which it waits for another remote control signal.
- If the first data in the remote control signal is invalid, a second data is observed. If the second data is valid, it is used for remote control.
- If the second data is also invalid, a third data is observed ... and so forth.
- If valid data are received successively, control codes corresponding to the data are output successively.

Custom code

	C0	C1	C2	C3	C4	C5	C6	C7
(A3)	I	I	0	0	0	I	0	I

Logical format

0 :

The states ("1" or "0") of the custom and data codes are determined by the width of the data pulses.

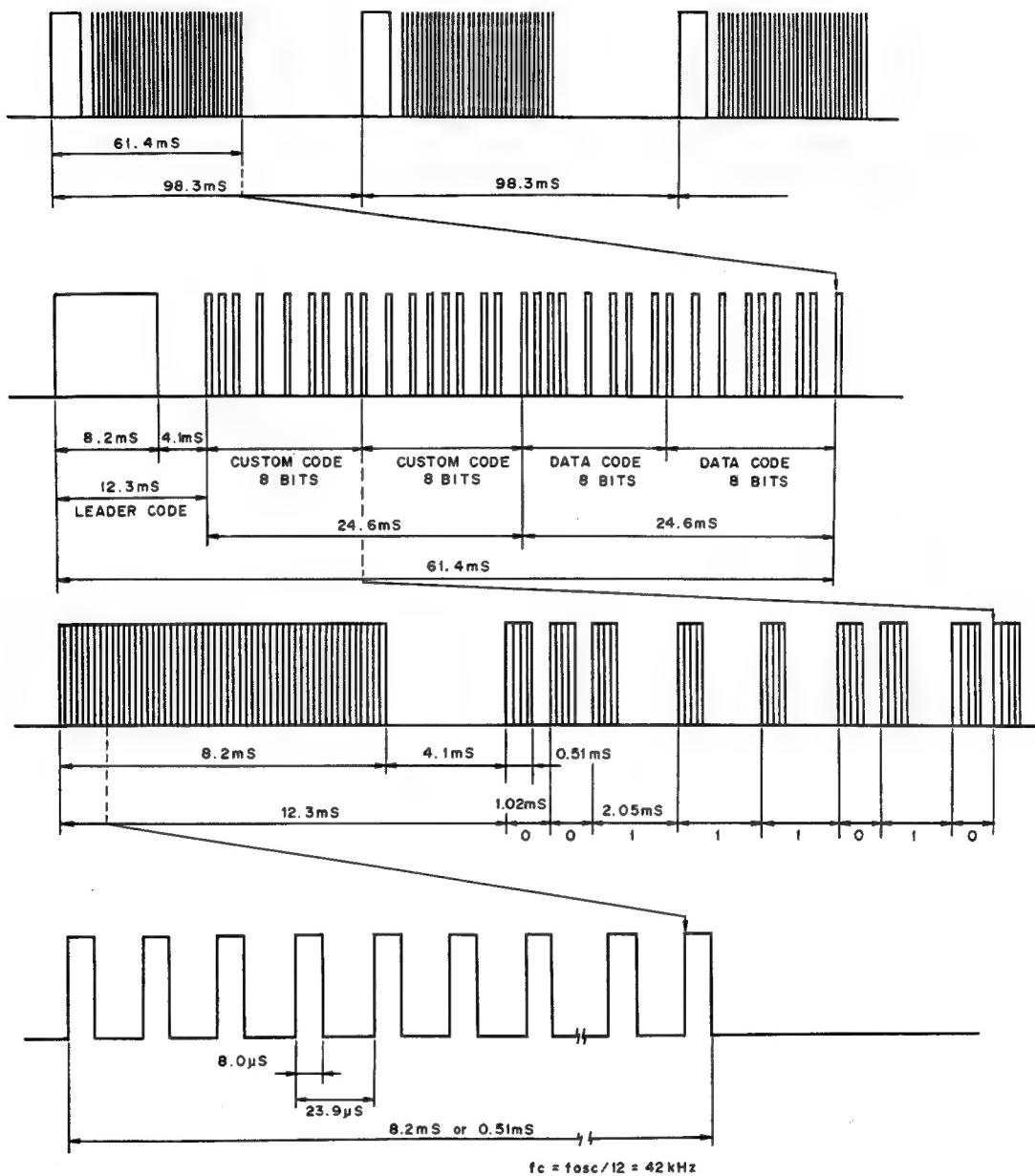
I :

Data code

	D0	D1	D2	D3	D4	D5	D6	D7	Control mode	Notes (HEX code) 012
K2	I	0	0	0	0	0	0	0	I	(01)
K3	0	I	0	0	0	0	0	0	2	(02)
K4	I	I	0	0	0	0	0	0	3	(03)
K5	0	0	I	0	0	0	0	0	4	(04)
K6	I	0	I	0	0	0	0	0	5	(05)
K7	0	I	I	0	0	0	0	0	6	(06)
K8	I	I	I	0	0	0	0	0	7	(07)
K9	0	0	0	I	0	0	0	0	8	(08)
K17	0	0	0	0	I	0	0	0	SKIP+	(10)
K18	I	0	0	0	I	0	0	0	SKIP-	(11)
K23	0	I	I	0	I	0	0	0	STOP	(16)
K24	I	I	I	0	I	0	0	0	START	(17)
K25	0	0	0	I	I	0	0	0	ARM	(18)
K37	0	0	I	0	0	0	I	0	REP	(44)
K38	I	0	I	0	0	0	I	0	CLEAR	(45)

Fig. 4-10 Remote Control Signal Codes

- Format



- Data structure

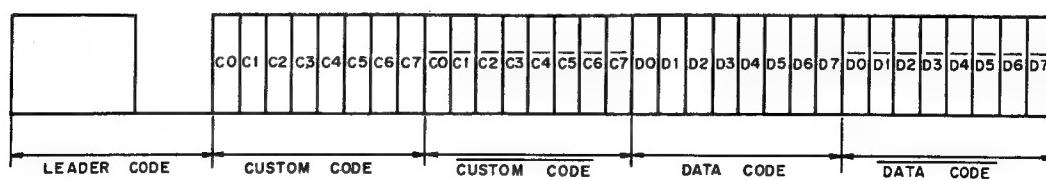


Fig. 4-11 Format and Data Structure of the Remote Control Signal

The remote control signal is received at the remote control signal receiver section of the SA-V70, and sent through the SA-V70's internal waveform shaping circuit and buffer to the REM IN terminal of the PL-V70. The data is then applied via a protection circuit made up of D15 through D17, to pins 7 and 21 of Q2. The input signal pattern at this stage is as shown in figure 4-11. This signal is decoded by Q2(PDE003) into the logical format described in figure 4-12 and output to Q1 (PD 6037), the system control IC. The signal is sent for at least 96 msec. If you keep pressing the commander key, however, the signal is continuously sent from Q2 until the commander key is released.

Check Mode of the Remote Controller Decoder Section

This mode is used to check whether the decoder section of the remote controller operates normally. If the PL-V70 is used alone, the decoder section can be checked only in this mode.

1. Remove the casing from the PL-V70.
 2. Ground pin 6 (REM) of connector CN4, and turn the power on. (This makes the remote signal receiver unit of the remote control commander unnecessary.)
 3. Every time the REM IN (JK1) terminal or REM OUT (JK2) terminal is grounded, the LEDs turn on or off as follows:
- Program 1 LED turns on → Program 2 LED turns on → Program 3 LED turns on → Clear (LED turns off)

Commander input key	Output logic of PDE003			
	9	10	11	12
1	L	L	L	L
2	L	L	L	H
3	L	L	H	L
4	L	L	H	H
5	L	H	L	L
6	L	H	L	H
7	L	H	H	L
8	L	H	H	H
SKIP +	H	L	H	L
SKIP -	H	H	L	L
STOP	H	H	H	L
START	H	H	L	H
ARM	H	L	H	H
REP	H	L	L	H
CLEAR	H	L	L	L
No input	H	H	H	H

Fig. 4-12

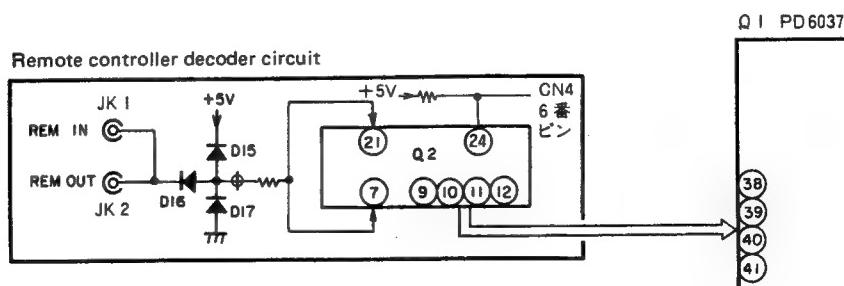


Fig. 4-13 Remote Controller Decoder Circuit

● Functions of PDE003 pins

Pin No.	Symbol	I/O	Pin name	Description		Notes
1	PD0	Output	REP	Individual output (Valid only when the component code is A3.)	OFF <input type="checkbox"/> ON <input checked="" type="checkbox"/>	"H" when in standby mode.
2	PD1	Output	ARM	Individual output (Valid only when the component code is A3.)	OFF <input type="checkbox"/> ON <input checked="" type="checkbox"/>	
3	PD2	Output	STOP	Individual output (Valid only when the component code is A3.)	OFF <input type="checkbox"/> ON <input checked="" type="checkbox"/>	
4	PD3	Output	START	Individual output (Valid only when the component code is A3.)	OFF <input type="checkbox"/> ON <input checked="" type="checkbox"/>	
5	Xtal	Input	—	Clock input, pin for external oscillator.		Ceramic oscillator, 800kHz.
6	Xtal	Input	—			
7	INT	Input	REM IN I	Connected to pin 22 (REM IN II), receives remote control signals.		
8	RESET	Input	—	Initial reset input.	— <input type="checkbox"/> Reset <input checked="" type="checkbox"/>	
9	PE0	Output	DATA L0	Decode data output pin.		"H" when in standby mode.
10	PE1	Output	DATA L1			
11	PE2	Output	DATA L2			
12	PE3	Output	DATA L3			
13	TEST	—	—	Grounded.		
14	Vss	—	—	Grounded.		
15	PF0	Output	DATA H0	Decode data output pin.		"H" when in standby mode.
16	PF1	Output	DATA H1			
17	PF2	Output	DATA H2			
18	PF3	Output	DATA H3			
19	PG0	Output	ANS. LED	Output for indicating "Data being output".	Standby <input type="checkbox"/> Data being output <input checked="" type="checkbox"/>	Equivalent to KEY STROBE
20	VDD	—	—	+5V		
21	PA0	Input	REM IN II	Connected to REM In I, receives remote control signals.		Remote control signal
22	PA1	Input	COMPO I	Pin for setting component code.		Valid only at initial reset time.
23	PA2	Input	COMPO II	Pin for setting component code.		Valid only at initial reset time.
24	PA3	Input	DECODE/CHECK	Pin for switching decode/check mode.	DECODE <input type="checkbox"/> CHECK <input checked="" type="checkbox"/>	Valid only at initial reset time.
25	PC0	Output	LOCATE(F)	Individual output (Valid only when the component code is A3.)	OFF <input type="checkbox"/> ON <input checked="" type="checkbox"/>	"H" when in standby mode.
26	PC1	Output	LOCATE(F)	Individual output (Valid only when the component code is A3.)	OFF <input type="checkbox"/> ON <input checked="" type="checkbox"/>	
27	PC2	Output	SPEED	Individual output (Valid only when the component code is A3.)	OFF <input type="checkbox"/> ON <input checked="" type="checkbox"/>	
28	PC3	Output	SIZE	Individual output (Valid only when the component code is A3.)	OFF <input type="checkbox"/> ON <input checked="" type="checkbox"/>	

Fig. 4-14

4.2 CONTROL PANEL EXPLANATION

- **KEY SW (Control Switches)**

The control panel of this player is as shown in figure 4-15. It performs the following functions:

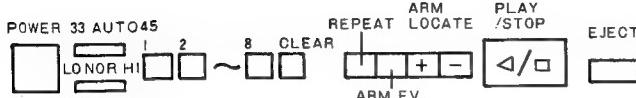


Fig. 4-15 KEY location

4.2.1 Power SW (Power Switch)

This switch turns on the power, resets the player, and returns the tonearm to the rest. (When the slide base is opened, the unit resets and returns the arm to the rest.)

- The UP light is on All others are off.
- The phono motor is stationary.

4.2.2 Speed SW (Speed Selector)

Sliding the speed selector to either 33 or 45 sets the phono motor rpms to 33 or 45 respectively. If the slide base is closed with this switch in the AUTO position, and then the unit is set to fully automatic or program selection mode, the player will select the motor speed automatically, based on the size of the record.

Record sized:

- 30 cm 33 1/3 rpm
- 25 cm 33 1/3 rpm
- 17 cm 45 rpm

If you use the locate switch to play records manually (without using the automatic or program selection functions), the turntable will play all records at 33 1/3 rpm while the speed selector is in the AUTO position. If the slide base is opened after the size has been set, the rpm setting will be reset to 33 1/3 rpm. (If the speed selector is set to 33 or 45, however, the rpm setting will not change even when the slide base is closed.)

4.2.3 1 – 8 SW (Program Selection Switches)

- These are pressed for program selection.
- Selection repeat (up to 8 times) and programming (up to 15 steps) are possible.
- Pressing any of the buttons 1 through 8 will cause the tonearm to begin to search. It will move from the rest to the end of the record. When it has finished, the LED display will begin to blink, and the tonearm will proceed to the first selection on the program. However, if the tonearm has already searched after the slide base is closed, then the LED display will start blink-

ing without an additional search taking place. It will proceed directly to the first selection on the program. (If the slide base is opened, however, that search data will be cleared.)

- It is possible to add more selections to the program at any time. (Regardless of whether the tonearm is leading-in tracing or searching.) Moreover, when the selections have finished, or when the tonearm is returned with the S/S switch or the CLR switch, it is possible to reprogram selections even with the slide base out. The tonearm will return to the rest. And if the slide base is in position, the unit will begin to lead in or search.
- Reprogramming is not possible during fully automatic selection playing.

4.2.4 CLR SW (Clear Switch)

- Pressing this button clears all previously programmed selections.
- It can be used at any time. Like the S/S switch, the CLR switch interrupts the program that is being played. (The tonearm will return to the rest.)

4.2.5 REP SW (Repeat Switch)

- This switch is used to repeat (or stop repeating) a selection.
- A selection may be repeated up to a maximum of 8 times. (During both program selection and fully automatic selection playing.) The LED display will start blinking when the weight repeat has been programmed.
- It can be used at any time. (It turns ON or OFF with each press of the button.) When the unit receives a "REP ON" command after it has finished playing a selection, or when the tonearm is returning after pressing the S/S switch, it will interpret this to mean that it should repeat starting with the next selection. When the "REP ON" command is made (except when the tonearm is on the rest) the player will first finish playing the entire side (when on automatic) or complete the entire program (when on program), return to the rest, and then lead in again.

4.2.6 EV SW (Cueing Switch)

- This switch raises and lowers the tonearm.
- The cueing switch will respond when the tonearm is all the way UP or tracing (all the way down, or moving down). When it is all the way up, it will respond to a down command, and when it is tracing, or moving down, it will respond to an up command. It won't respond to commands at any other time.

4.2.7 P/S SW (PLAY/STOP Switch)

- This switch is used to begin automatic playing and to end automatic or programmed playing.
- It can be used at any time.

When the slide base is open:

If the tonearm is on the rest, automatic playing will begin.

When the slide base is closed:

When the tonearm is not on the rest, playing will stop and any repeat commands will be cleared. The tonearm will then return to the rest.

All programming and repeat commands will be cleared.

4.2.8 < , > SW

This switch has two separate functions

1. Function 1 . . . Locate.

During automatic playing (when the tonearm is on the rest and the player is started using the S/S SW) and during manual playing (when the tonearm is on the rest and the player is started using the SW), this switch performs a locate function.

< SW ON . . . The tonearm will move toward the center of the record.

> SW ON . . . The tonearm will move toward the outside edge of the record.

2. Function 2 . . . Skip

During programmed playing (when the player is started using the program SW), this switch performs a skip function.

< SW (+SKIP) . . . Player stops playing present selection and goes on to the next. It will skip one selection for each time it is pushed.

> SW (-SKIP) . . . When pressed once it will return to the beginning of the present selection. If pressed N times, then it will go back N - 1 selections.

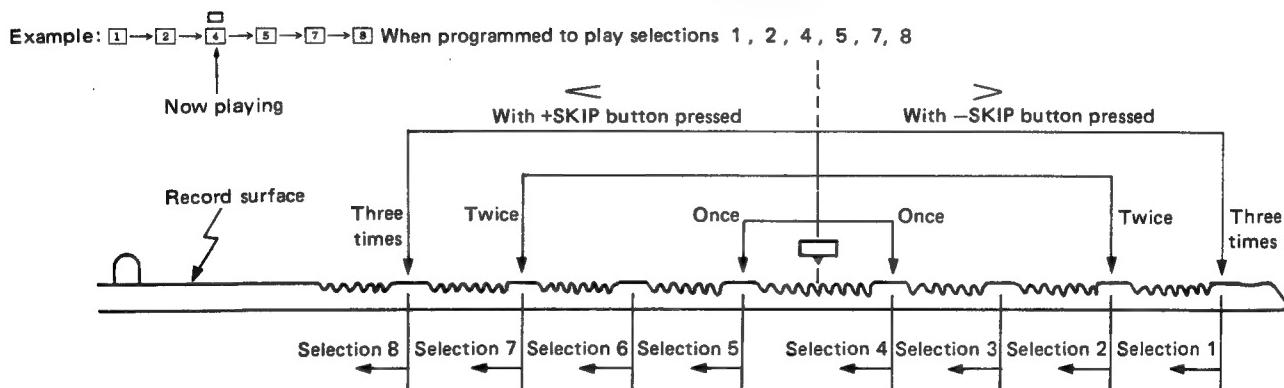


Fig. 4-16

4.3 MODE TRANSITION

4.3.1 Initial Reset

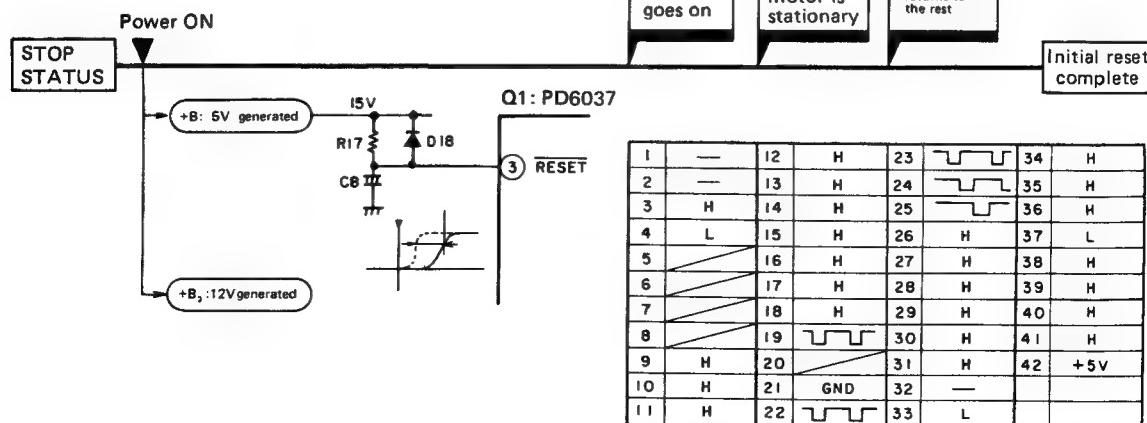


Fig. 4-17

4.3.2 Mode Transition Chart 1

- When using automatic playing (no standby input)

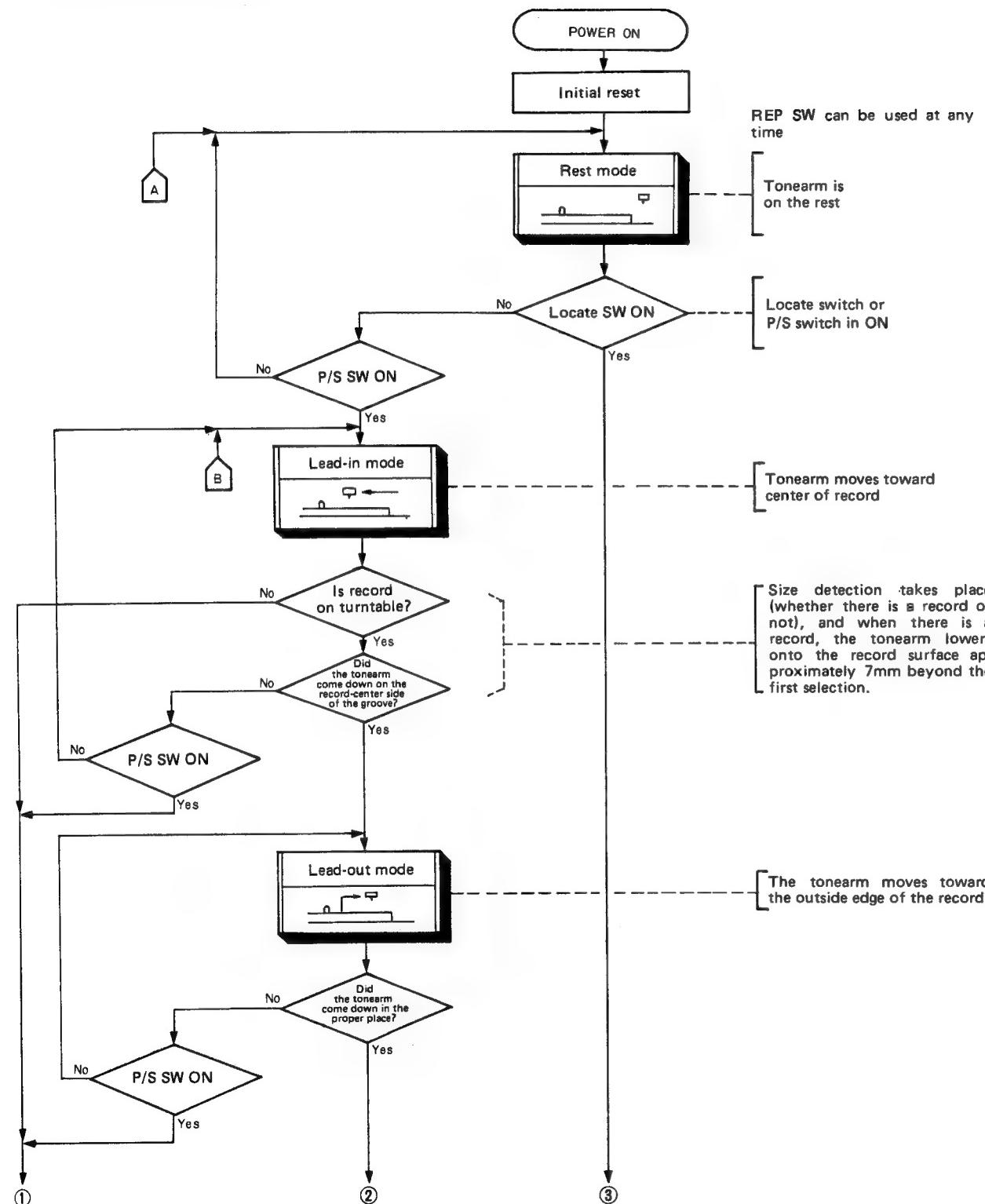


Fig. 4-18-1

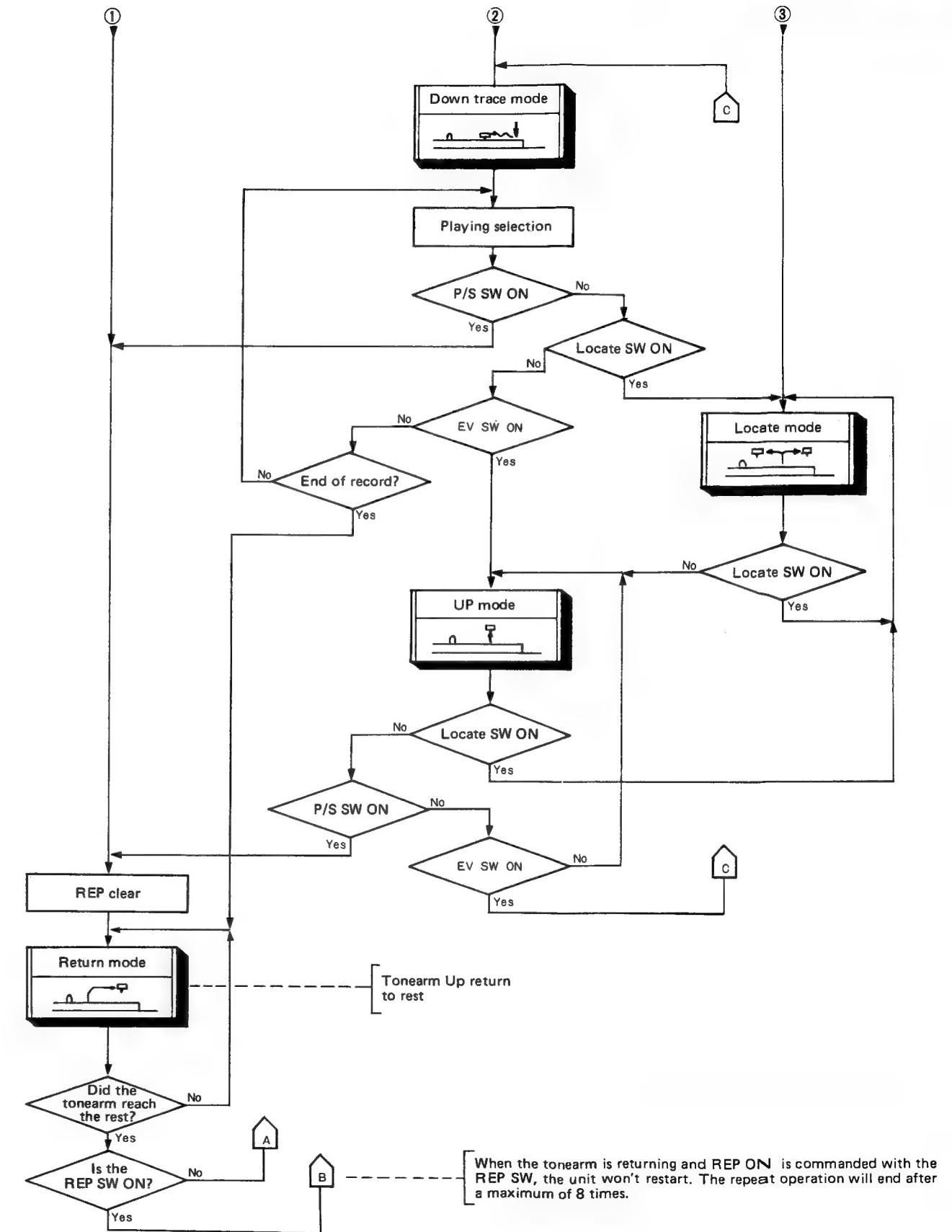


Fig. 4-18-2

4.3.3 Mode Transition Chart 2

• Using programmed playing (no standby input)

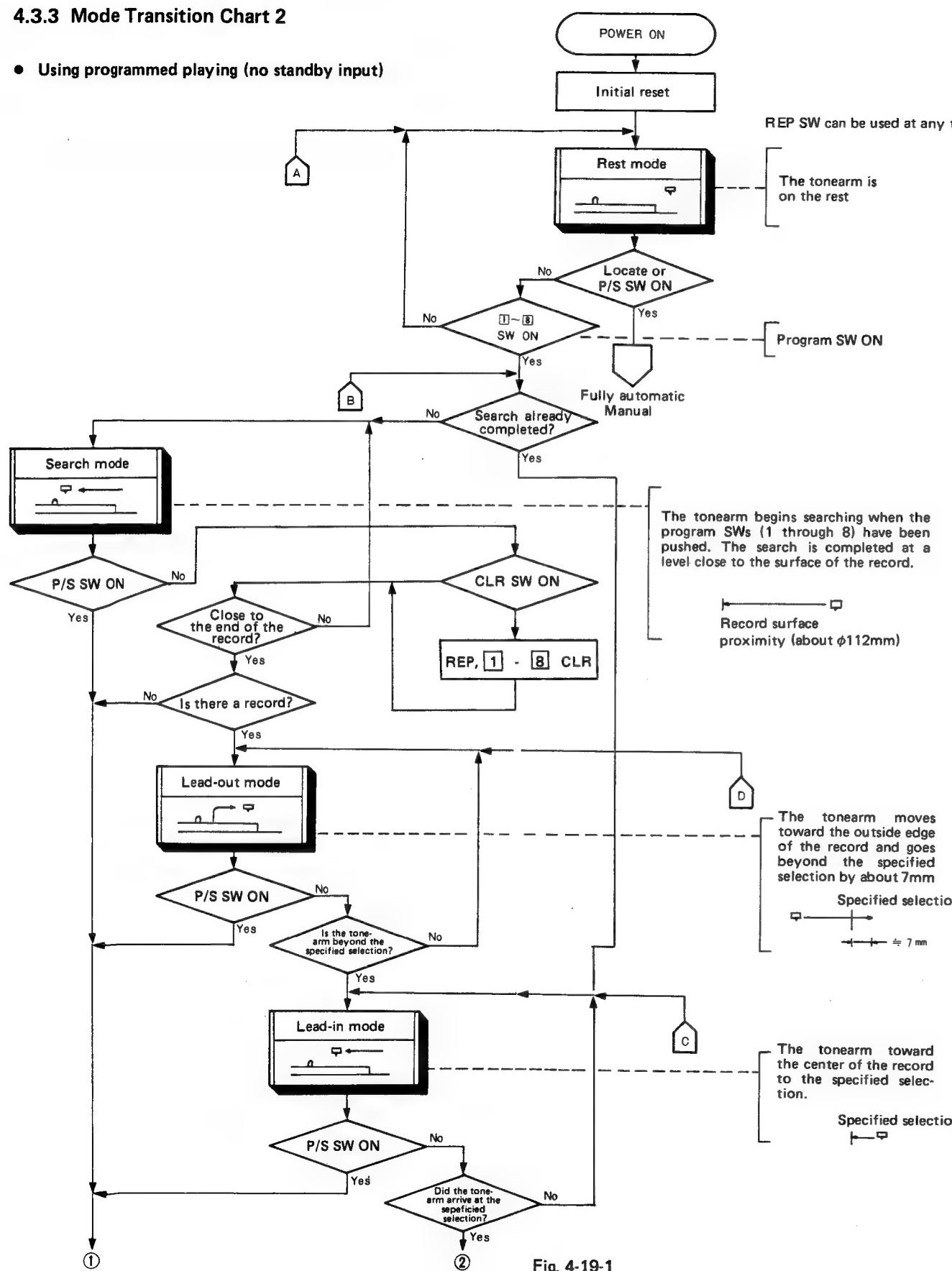


Fig. 4-19-1

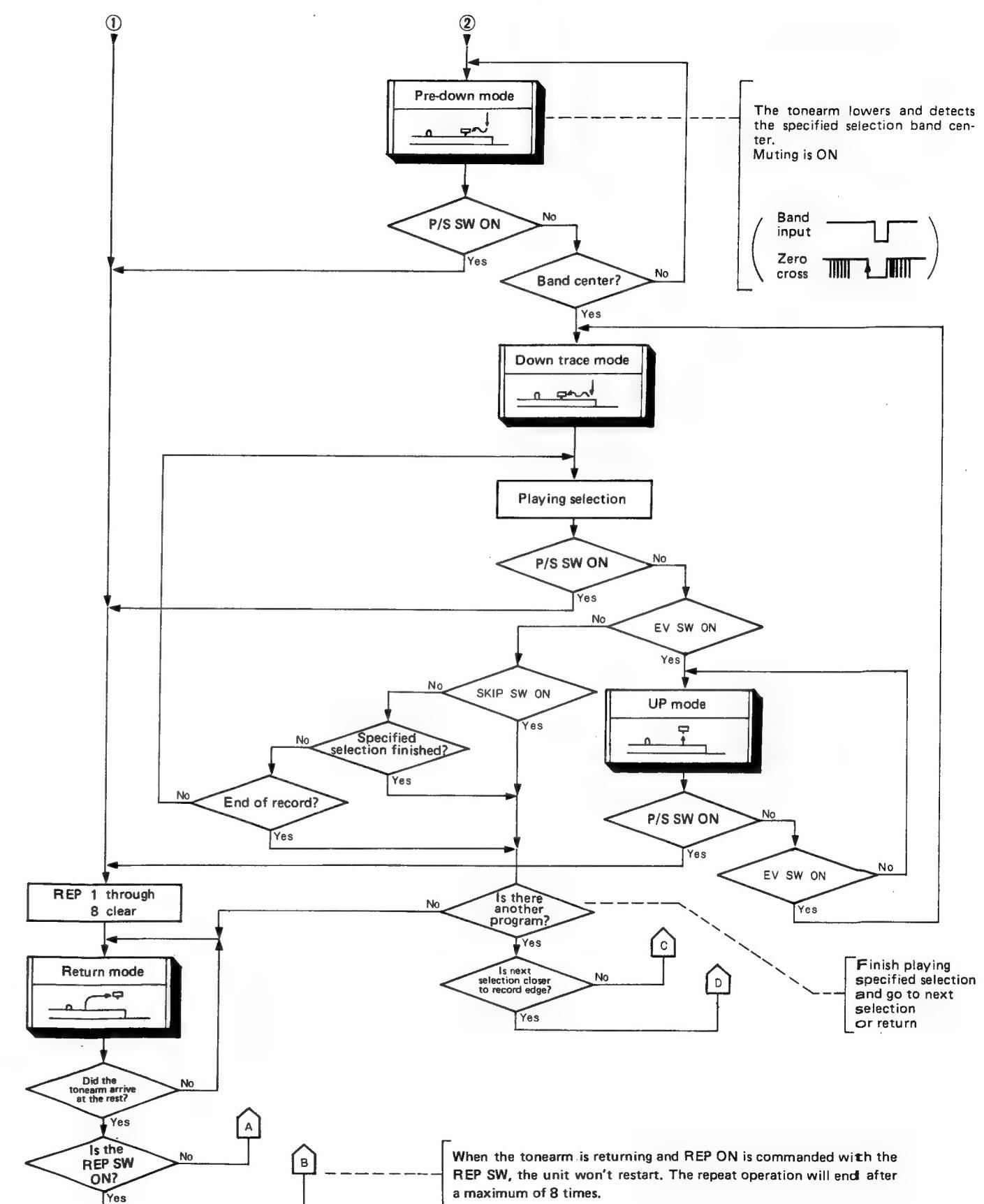


Fig. 4-19-2

4.4 OPERATION MODE EXPLANATIONS

4.4.1 Power ON

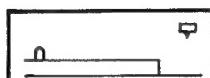
When the power is turned on or the cover is opened, the PL-V70 performs the following operations.

1. It returns the tonearm to the rest.
2. It turns off the program display (1 through 8) and the REP display LEDs and turns on the UP display LED.
3. It stops the phono motor rotation.
4. It turns the muting on.

Note:

In case of PL-V70, the UP LED blinks while the arm is moving.

4.4.2 Rest Mode



With the PL-V70 on and awaiting input, all of the functions work with the exception of the EV SW. During the rest mode, the buttons, when pushed, perform the following functions.

1. SWs 1 through 8

Pushing any of these will start the search mode.

When searching has already been completed the lead-in mode will begin.

2. REP SW

This turns the repeat function ON and OFF alternately.

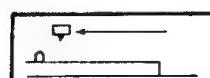
3. < SW

This turns the turntable and moves the tonearm toward the record center. With manual playing, it works as a locate SW.

4. P/S SW

This starts the lead-in operation during automatic playing. (The turntable rotates and player switches to lead-in mode)

4.4.3 Search Mode



It does the following while moving the tonearm from the rest to the center of the record.

1. It determines the size of the record. (And the speed as well)
2. It records the band address.
3. It detects programmed selection.

When the speed SW is set to AUTO, the speed for 30cm and 25cm records is 33rpm. When the search mode detects a 17cm record, then it sets the speed to 45rpm. However, at this point, the turntable is not yet spinning.

When the tonearm gets to the 17cm size area and detects no record, it then clears the program and repeat(s) (if any) and returns to the rest. (Switches to return mode.)

When the tonearm comes to the end of a record and it has programmed selection number that is higher than the actual number of record selections, it clears those numbers from its memory and begins the lead-out operation. (Switches to lead-out mode) For example, if the number of actual selections are programmed, then the numbers above 6 are cleared from the memory.

In the search mode, all functions work with the exception of EV, <>, > SWs.

1. SWs 1 through 8

Repeat input is possible, and up to 15 steps can be programmed into the PL-V70.

2. CLR SW

It clears everything in the memory and the search operation will continue.

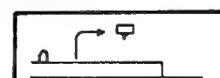
3. REP SW

It turns the repeat ON and OFF alternately.

4. P/S SW

It clears programmed selections and/or repeats and starts the return operation. (Switches to return mode.)

4.4.4 Lead-Out Mode



● During automatic playing

This moves the tonearm toward the outside edge of the record until it addresses the first selection.

Then it stops moving the tonearm, and starts to move it DOWN. (Switches to down trace mode.)

- During programmed selection playing

If the EV is DOWN, then it brings the tonearm UP and moves it toward the outside edge of the record. However, depending on whether it is pushed during the first selection of a program or after that, the operations change.

1. When pushed during the first selection of a program. It moves the tonearm to the address of the first selection, and thereafter operates as with automatic selection playing.
2. When pushed during subsequent selections of a program. It moves the tonearm back 64 address units from the selection address (approximately 7.3mm toward the outside edge of the record) where it changes direction and begins the lead-in operation. (Switches to lead-in mode.)

In the lead-out mode the REP and S/S SWs work, but the other functions, program SWs (1 through 8) and the CLR only work during programmed selection playing.

1. REP SW

This turns the repeat ON and OFF alternately.

2. P/S SW

This clears any programming and/or repeat(s) and starts the return operation. (Switches to the return mode.)

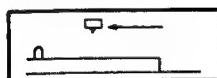
3. SWs [1] through [8]

These permit repeating the same selection and the addition of more programming (up to 15 steps) during programmed selection playing.

4. CLR SW

This clears programming. After that, it switches to automatic playing. (It starts leading out to the first selection)

4.4.5 Lead-In Mode



- During fully automatic playing

If the size of the record has not yet been determined, the tonearm does this while moving to the address of the first selection +64 address units, (approximately 7.3mm closer to the center of the record). These is changes direction and begins to lead out. (Switches to lead-out mode.)

- During programmed selection playing

This mode moves the tonearm toward the center of the record. Depending on whether the button is pushed during the first selection of a program or during subsequent selections, the operations change as follows.

1. When pushed during the first selection of a program. It moves the tonearm to the address of the first selection +64 address units (approximately 7.3mm toward the center of the record), changes direction, and starts to lead out. (Switches to lead-out mode.)

2. When pushed during subsequent selections of a program. It moves the tonearm toward the center of the record, to the programmed selection address -16 address units (approximately 1.8mm toward the outside edge of the record), where it begins detecting the band.

While moving the tonearm toward the center of the record it detects a trailing signal () as shown in figure 4-20. The tonearm stops when it has detected the signal, and then lowers. (Switches to pre-down mode.)

When the tonearm doesn't detect a band even after going to the programmed selection address +16 address units (about 1.8mm closer to the center than the band) then it begins leading out. (Switches to lead-out mode.)

When the tonearm has not detected the selection band after repeating the lead-in/lead-out sequence 4 times it goes on to the next programmed selection.

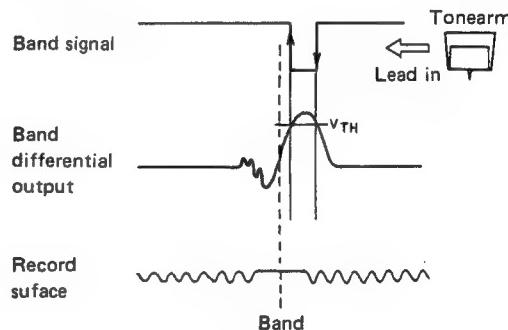
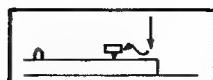


Fig. 4-20

In the lead in mode, as with the lead out mode, the REP and P/S switches work, but the other functions, program switches ([1] through [8]) and the CLR only work during programmed selection playing. The operations performed after the commands are received are the same as with the lead out mode.

4.4.6 Pre-Down Mode



The pre-down mode is the mode which moves the tonearm down after the band has been detected by the lead-in mode (during programmed selection playing for all selections except the first). After the tonearm goes down, it traces the air with the muting ON until it finds the center of the band (zero cross).

Then the tonearm goes down, a landing sensor starts the tracking when the tonearm comes to rest on the record. When the zero cross input H is detected while tracking, the muting is turned off and normal tracing begins. (Switches to down trace mode.)

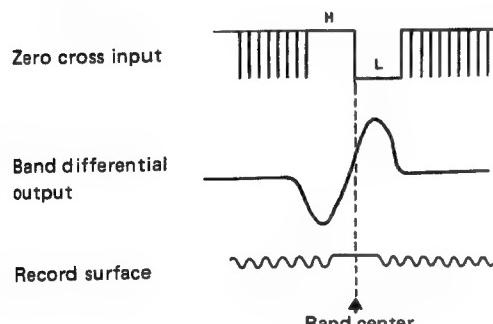


Fig. 4-21

In the pre-down mode all of the input SWs function.

1. SWs 1 through 8

Selection repeat is possible, and up to a maximum of 15 steps are programmable.

2. CLR switch

3. REP switch

Turns the repeat function ON and OFF alternately.

4. EV switch

Starts the UP operation. (Switches to UP mode.)

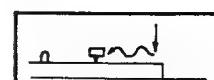
5. < , > SW

Starts the +SKIP and -SKIP operations. (Switches to the lead out-mode.)

6. P/S SW

Clears programmed repeat(s) and starts the return operation. (Switches to the return mode.)

4.4.7 Down Trace Mode



With fully automatic playing

It turns off the UP LED and sets the tonearm down.

During the first second of lowering the tonearm, the elevation solenoid draws a current of 170mA. After that, it draws 70mA.

The leading sensor determines whether or not the tonearm is in contact with the record. When it senses that it is, it begins to watch for the end.

When it has detected the end, it checks the repeat LED, and if there are any repeats, it counts them and begins the return operation. (The maximum number of repeats is 8, and the repeat LED will begin blinking when the number of repeats reaches 8.) (It then switches to the return mode.)

With programmed selection play

As with fully automatic playing, the UP LED is turned off and the tonearm is lowered. When the landing sensor comes to rest on the record, it runs OFF the muting and turns ON the tracking. With the position of the tonearm within $\phi 125\text{mm}$ the sensor watches for the end.

When switching to this mode from the pre-down mode, the muting is switched to OFF. (There are other changes.)

While tracing with the tracking on, this mode watches the tonearm position address and when it comes to the band at the end of the selection it is displaying — 16 address units (approximately 1.8mm from that band toward the outside edge of the record) it starts the band sensor.

When it detects the middle of a band (at the end of the record it detects the end), it turns ON the muting, and lifts the tonearm up in order to continue on to the next selection in the program. (Switches to lead-out mode.)

When all of the programmed selections have finished, this mode checks the number of repeats and if there are any, begins the repeat operation. (Switches to the return mode) (The maximum number of repeats is 8, and when the number of repeats reaches 8 the REP LED begins blinking.)

With down trace all of the functions work during programmed selection playing, and with automatic playing all functions work except the program switches and the clear SW.

1. REP SW

It turns the repeat function ON and OFF alternately.

2. EV SW

It starts the UP operation. (Switches to UP mode.)

3. P/S SW

It clears and programming and/or repeats and/or repeats and starts the return operation. (Switches to the return mode.)

4. < , > SW

• With programmed selection playing.

Starts the +SKIP -SKIP operations. (Switches to the lead-out mode.)

• With fully automatic playing

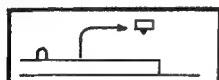
Starts the UP operation. (Switches to the UP mode.) The following function only operate with programmed selection playing.

5. SWs 1 through 8

Selection repeat and up to 15 steps of additional programming is possible.

6. CLR SW

4.4.8 Return Mode



If the tonearm is DOWN (EV DOWN) then it lifts it UP, stops the turntable, and returns the tonearm to the rest.

If the repeat SW is ON, (Except when turned to during return) then at the same time that the tonearm returns to the rest, it will start the runtable rotating in order to play the next selection, and begin leading in the tonearm. (Switches momentarily to the lead-out mode and then to the lead-in mode.)

At times other than these, (i.e. turning the REP SW ON during return) the tonearm will be at the rest on standby unless there is a command to start from one of the program SWs or the P/S SW. (Switches to the rest mode.)

When the playing has finished, or has been terminated, program switches 1 through 8 still function while the tonearm returns to the rest. When the tonearm returns to the rest, and if the search operation has not yet been completed (i.e., the slide base was opened during tonearm return), then the search operation begins. (The unit enters the search mode.) If the search operation has already been completed, the lead-in operation

begins. (The unit enter the lead-in mode.) If the slide base is out, the tonearm remains on the rest until the slide base is closed.

In the return mode, the operable switches differ depending on whether t is a return that takes place during a repeated selection, or a return that takes place at the end or middle of a selection.

- **With a return during a repeated selection. (REP SW ON)**
During automatic or programmed selection playing.)

1. REP SW

It runs the repeat function ON or OFF alternately.

(Cancels the repeat selection.)

2. P/S SW

This clears the programmed selection and/or repeats.

(Cancels the repeat selection.)

(This works with programmed selection playing, but not with fully automatic playing.)

3. SWs 1 through 8

Selection repeat and up to 15 steps of additional programming are possible.

4. CLR SW

This switch clears the stored program and the repeat mode, and returns the arm to the rest.

- **With a return at the end or middle of a selection**

1. SWs 1 through 8

Repeat input is possible, and up to 15 steps of new programming is possible.

2. CLR SW

This clears all programmed selections.

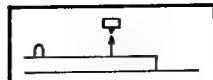
3. REP SW

This turns the repeat function ON and OFF alternately.

4. P/S SW

Clears all programmed selection and/or repeats.

4.4.9 UP Mode



This mode lights the UP LED, turns ON the muting and raises UP the tonearm. When the EV chip and the EV bar make contact and the stylus leaves the surface of the record, the landing sensor detects this and turns OFF the tracking. Then, after about 1.1 seconds it detects that the tonearm has moved UP.

Function that will work when the tonearm is UP and when it is moving UP differ depending on whether the playing is fully automatic or programmed selection.

- During fully automatic playing

1. The **CLR SW** and **1** through **8** don't function.

2. **REP SW**

Turns the repeat function ON and OFF alternately.

3. **EV SE**

- When the tonearm is moving UP no response.

- When the tonearm is UP the down operation takes place.

(Switches to down trace mode.)

4. **< , > SW**

- When the tonearm is moving UP no response

- When the tonearm is UP the locate operation begins.

(Switches to locate mode.)

5. **P/S SW**

It clears the repeats and starts the return operation.

(Switches to the return mode.)

- During programmed selection playing

1. SWs **1** through **8**

Selection repeat and up to 15 steps of additional programming are possible.

2. **CLR SW**

Clears all programmed selections, and then switches to fully automatic playing.

3. **REP SW**

Turns the repeat function ON and OFF alternately.

4. **EV SW**

- When the tonearm is moving UP

no response

- When the tonearm is UP

the down operation takes place.

(Switches to down tape mode.)

5. **< , > SW**

- When the tonearm is moving UP

it begins ± SKIP operations.

(Switches to the lead-out mode.)

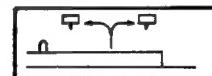
- When the tonearm is UP

no response.

6. **P/S SW**

Clears all programmed selections and/or repeats and begins the return operation. (Switches to return mode.)

4.4.10 Locate Mode



The locate mode is a passing mode that works during programmed selection playing when the SW or the < SW is pushed and held.

When the < SW is ON,

The tonearm moves toward the center of the record. (up to approximately φ106mm)

When the > SW is ON,

The tonearm moves toward the outside edge of the record. (up to the rest)

When the </> SW is OFF, the tonearm stops, and goes into the UP position. (Switches to the UP mode.)

- Do not push 2 buttons at the same time with the PL-V70, regardless of the modes. None of the input will be accepted when two function buttons are pushed at the same time. (However, it is possible to change the 33/45 speed while performing another function.)

Modes and the corresponding operable functions

Prog . . . Programmed selection playing
Full . . . Automatic playing

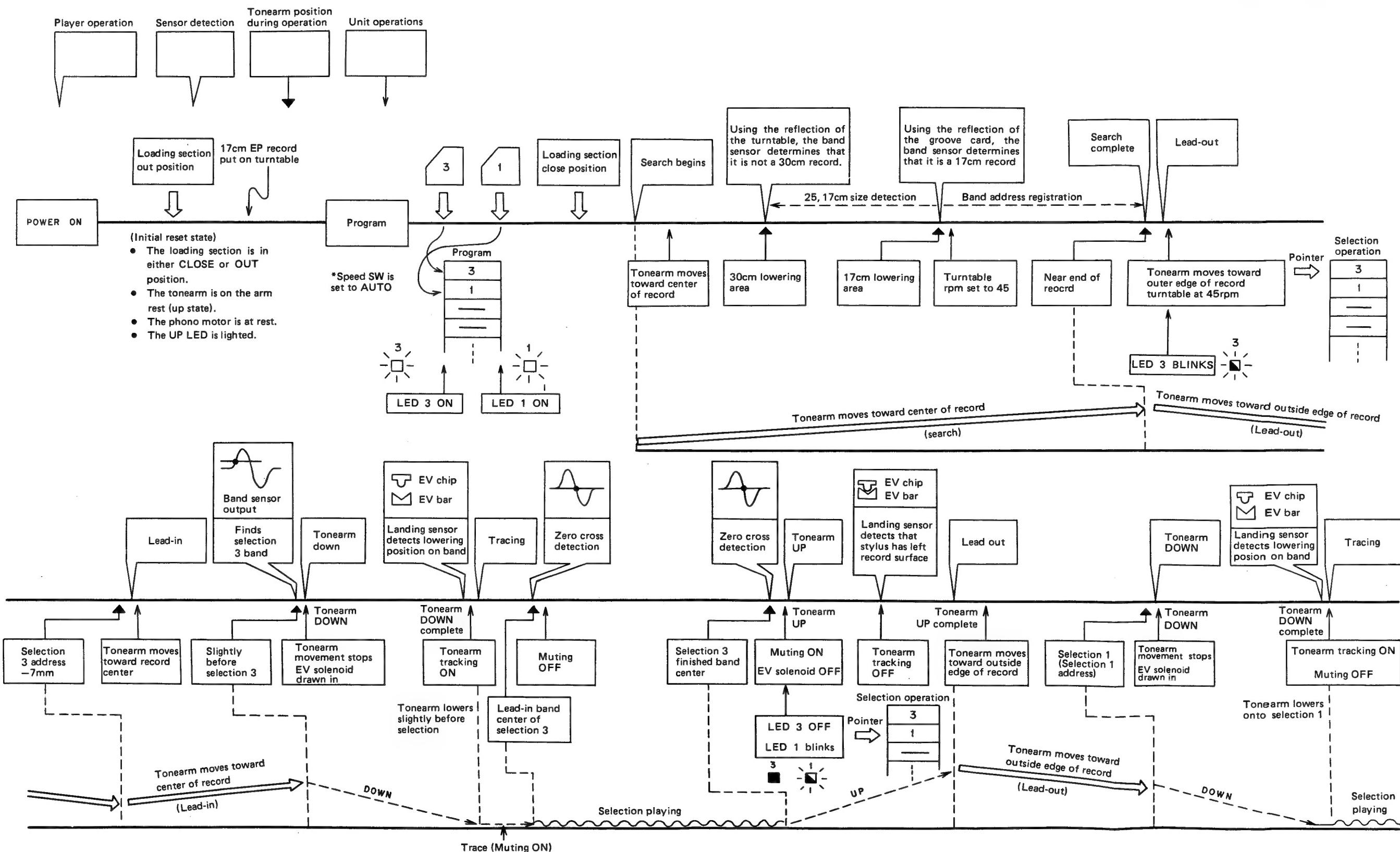
Switch name Mode	Program 1 through 8		Clear CLR	Repeat REP	Tonearm elevation EV	Play/Stop P/S	Locate/skip	
	Search system (Search)	Search system (Lead-out)					+SKIP <	-SKIP >
Rest mode			X	O	X	Lead-out		Locate
Search mode		O	O	O	X	Return		X
Lead-out mode	Prog O	Full X	O	O	X	Return		X
Lead-in mode	O	X	O	O	X	Return		X
Pre-down mode	O		O	O	UP	Return		Lead-out
Down trace mode	O	X	O	O	UP	Return	Prog Lead-out	Full UP
Return mode	O	X	O	O	X	Return		X
UP mode	O	X	O	O	Down trace	Return	X	Locate
Locate mode	—	—	—	—	—	—	—	—
(Slide base lead-out completed)	O	O	O	O	X	* O		X

(—Do not push two function buttons at the same time.)
(* Clears 1 through 8)
(O = Yes, X = No)

Fig. 4-22

4.5 OPERATION CHART

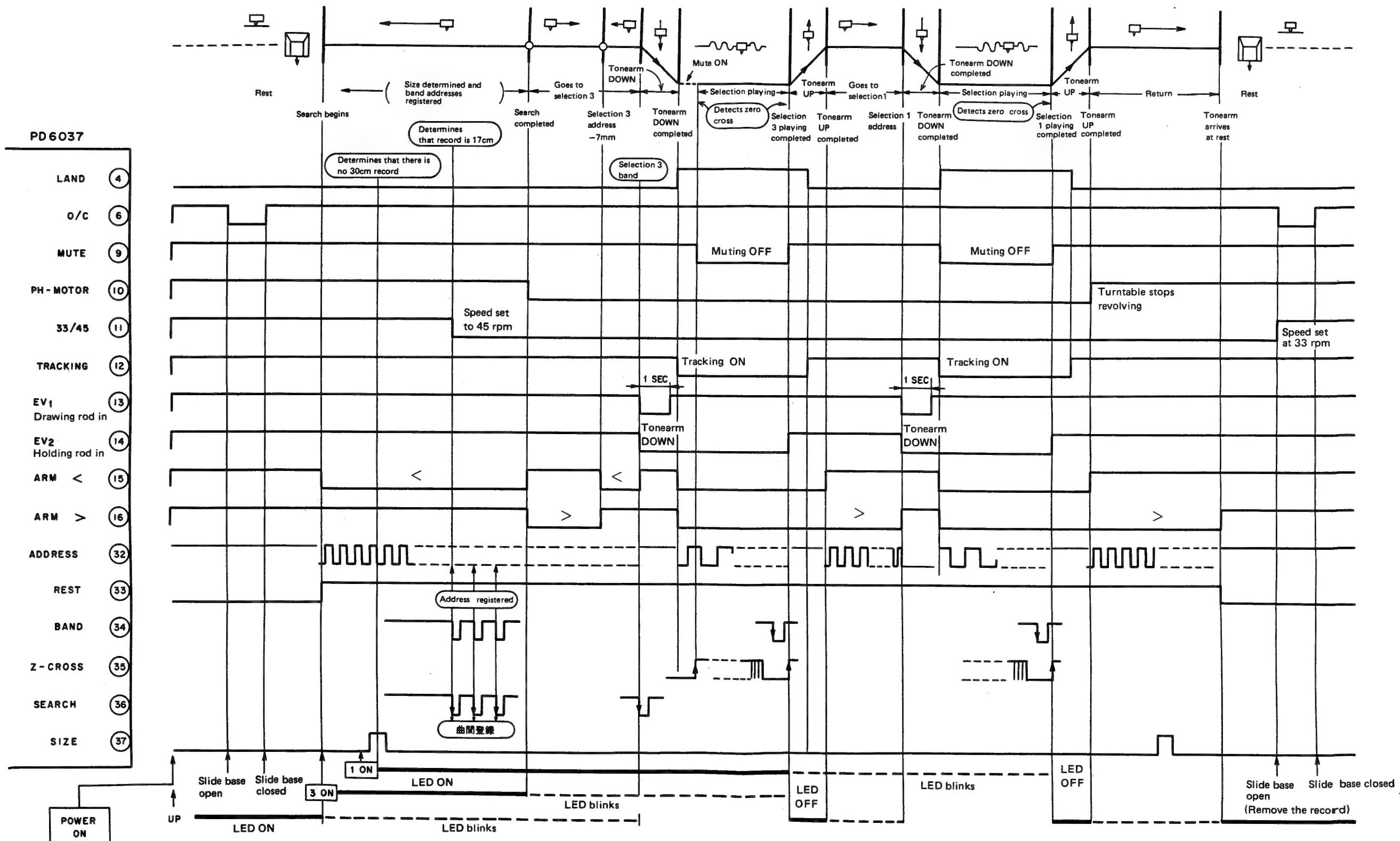
17 cm EP record Programmed to go from selection 3 to selection 1



4.6 TIMING CHART

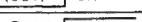
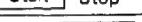
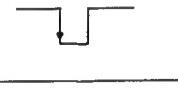
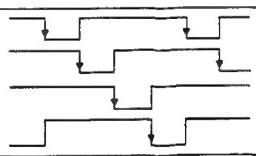
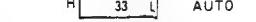
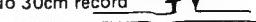
17cm EP record a single cycle of operations performed in going from selection 3 to selection 1

With SPEED SW set to AUTO No. F. STNBY input



4.7 IC INFORMATION

● PD6037

Pin No.	Symbol	Terminal name	I/O	Function	
1	Extal	—	—	Terminal with a built-in clock oscillator to connect with outside circuits (Ceramic oscillator f=3MHz)	
2	Xtal	—	—		
3	RESET	—	I	CPU initial reset input (normally H) 	
4	IRQ	LAND	I	Tonearm down complete detection input 	
5	SO	Not in use	/		
6	SI	O/C	I	Slide base in/out detection switch input	
7	SC/TO	Not in use	/		
8	TC	Not in use	/		
9	P0	MUTE	O	Muting ON/OFF (Deck synchronizer output) 	
10	P1	PH-MOTOR	O	Phono motor start/stop output 	
11	P2	33/45	O	Phono motor 33/45 switch output 	
12	P3	TRAKING	O	Tonearm tracking during tracing 	
13	O1	EV1 (drawing rod in)	O	Tonearm elevation drive output (drawing rod in) drawing time 1 second 	
14	O1	EV2 (holding rod in)	O	Tonearm elevation drive output (holding rod in) 	
15	O2	ARM <	O	Tonearm motor drive output (movement toward center of record) 	
16	O3	ARM >	O	Tonearm motor drive output (movement toward outside edge of record) 	
17	O4	LED	O	LED matrix output	When LED is ON 
18	O5	LED	O	LED matrix output	
19	O6	LED	O	LED matrix output	
20	O7	Not in use	/		
21	VSS	—	—	GND	
22	R0	Digit	O	KEY LED matrix output	
23	R1	Digit	O	KEY LED matrix output	
24	R2	Digit	O	KEY LED matrix output	
25	R3	Digit	O	KEY LED matrix output	
26	R4	Key in	I	KEY matrix input	
27	R5	Key in	I	KEY matrix input	
28	R6	Key in	I	KEY matrix input	
29	R7	Key in	I	KEY matrix input	
30	R8	45rpm	I	33/45 speed switch 45 input 	
31	R9	33rpm	I	33/45 speed switch 33 input 	
32	R10	Address	I	Address sensor input 	
33	R11	REST	I	Rest switch input 	
34	R12	BAND	I	Band sensor band input 	
35	R13	Z-Cross	I	Band sensor zero cross input 	
36	R14	Search	I	Band sensor search input 	
37	R15	SIZE	I	30cm record size detection input 	
38	K0	REM IN L1	I		
39	K1	REM IN L0	I		
40	K2	REM IN L2	I		
41	K3	REM IN L3	I		
42	Vcc	—	—	+5V	

5. DISASSEMBLY

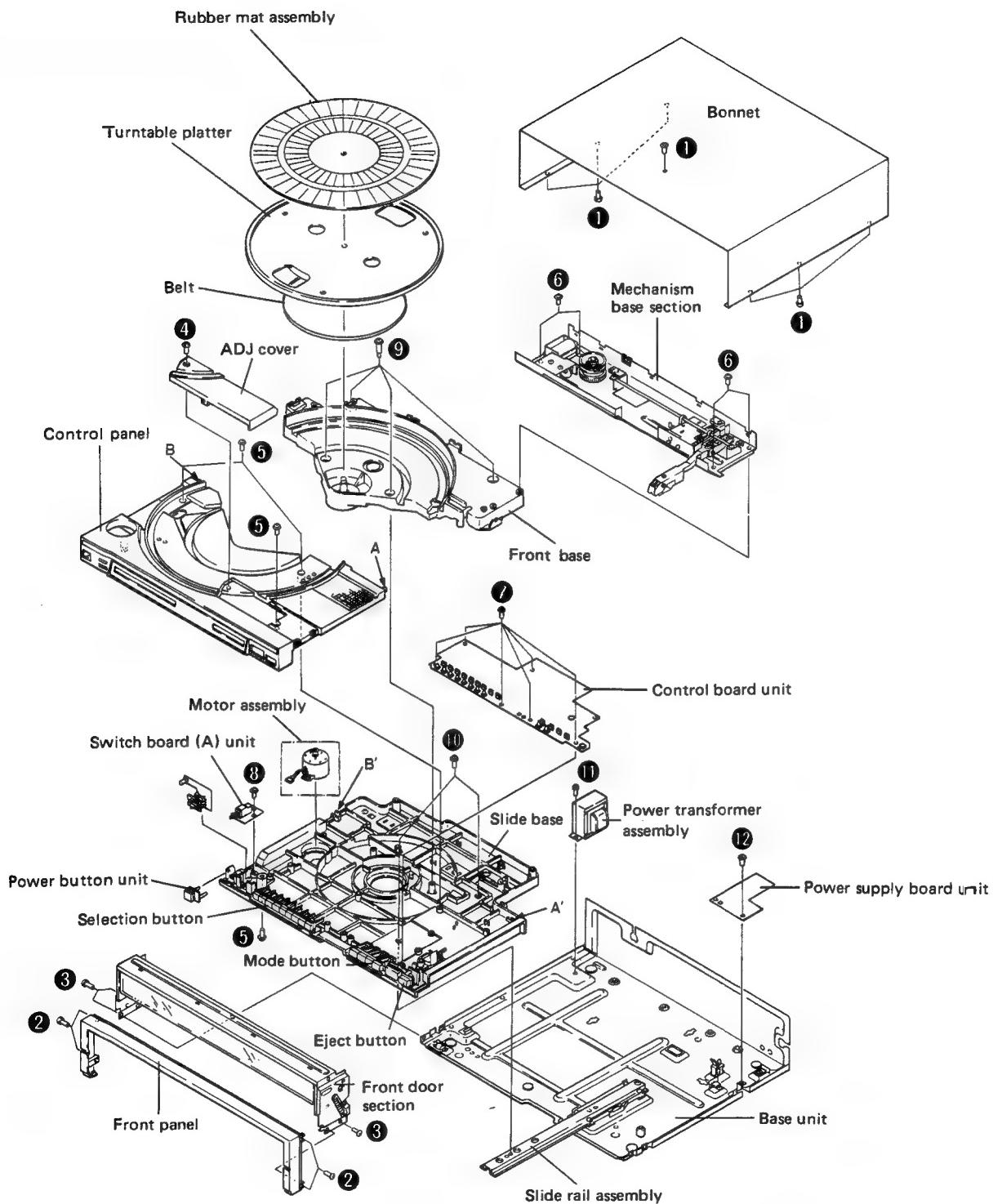


Fig. 5-1 Disassembly

5.1 DISASSEMBLY

1. Press the eject button and move the control panel to the position where the record can be removed. Remove the turntable mat assembly, turntable platter, and belt, and move the operation panel back to the PLAY position.
2. Removing screw ① releases the bonnet.
3. Removing screw ② releases the front panel.
4. Removing screw ③ releases the front door unit.
5. To remove the control panel, first remove screw ④ and then the ADJ cover. Then press the eject button to move the control panel out to the OUT position. Remove screw ⑤ and gently pull the control panel away from the unit. Note that the control panel can be removed with the bonnet in place.

When attaching the control panel, place the protruding parts A and B of the control panel in the holes A' and B' of the slide base, and push them in.

6. Removing screw ⑥ releases the mechanism base section.
7. Remove the program selection button, the mode button, and screw ⑦. The control board unit can now be removed.
8. Removing screw ⑧ releases the switch board (A) unit.
9. Removing screw ⑨ releases the front base.
10. Removing screw ⑩ releases the slide base from the slide rail assembly.

11. Removing screw ⑪ releases the power transformer assembly.
12. Removing screw ⑫ releases the power supply board unit.

5.2 CARRIAGE REMOVAL

1. Remove the fixer from the carriage and the wire from the pulley. (See Figure 5-2)
2. Remove the screw ⑬ and pull the guide bar away from the carriage in the direction indicated by the arrow. The carriage and tonearm assembly can now be removed.
3. Removing the spring will release the carriage board assembly, and removing screw ⑭ will release the mechanism base board assembly.

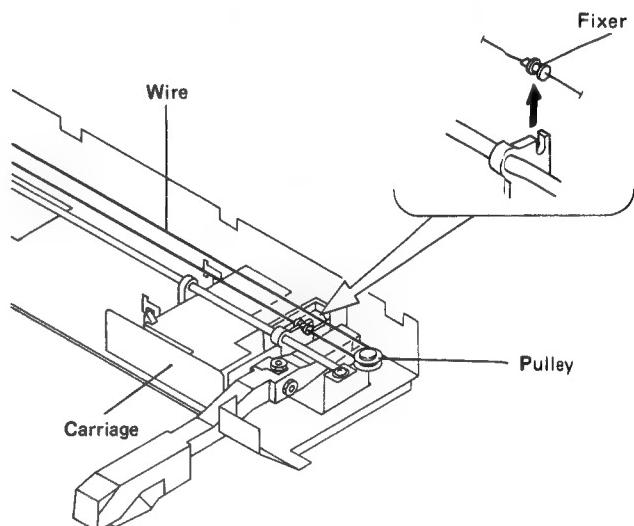


Fig. 5-3 Removing Carriage Wire

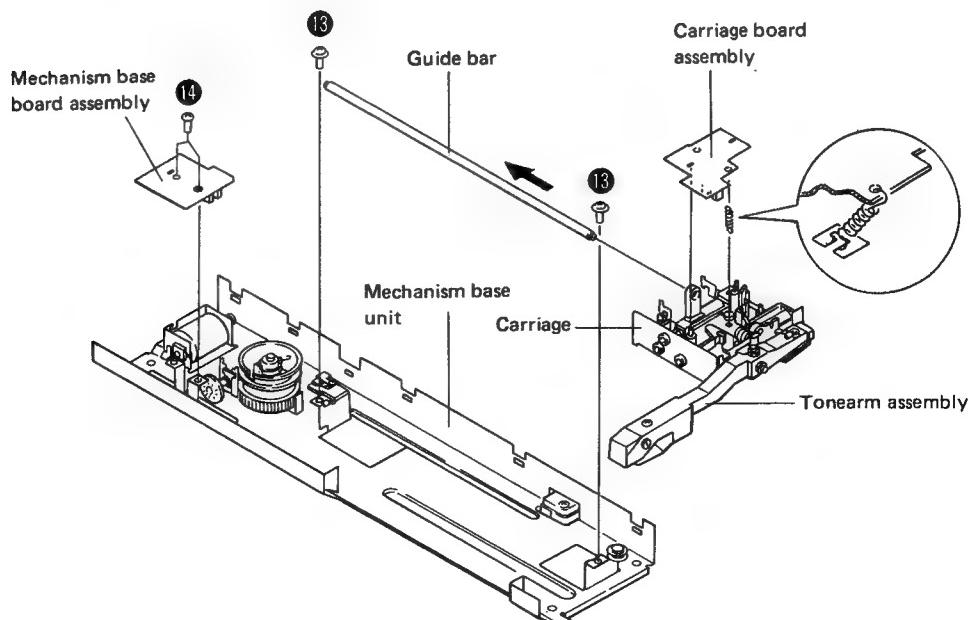


Fig. 5-2 Carriage Removal

5.3 REPLACING THE CARRIAGE WIRE

- After assembling the carriage and tonearm assemblies in the opposite order of the previous section, replace the carriage wire according to the following steps.

- Adjust the length of the wire unit as shown in figure 5-4 Ⓐ.
- Attach the wire unit grommet to the spring of the worm wheel as shown in figure 5-4 Ⓑ. Then wind the wire onto the worm wheel taking care not to let it get caught in the worm wheel groove. Also be careful not to let the wire overlap.

- Holding both the wire and the worm wheel, connect the wire to the wire guard and attach the worm wheel to the mechanism base.
- As shown in figure 5-4 Ⓒ, put the wire around the pulley, and push the fixer into the carriage until it locks with a click.

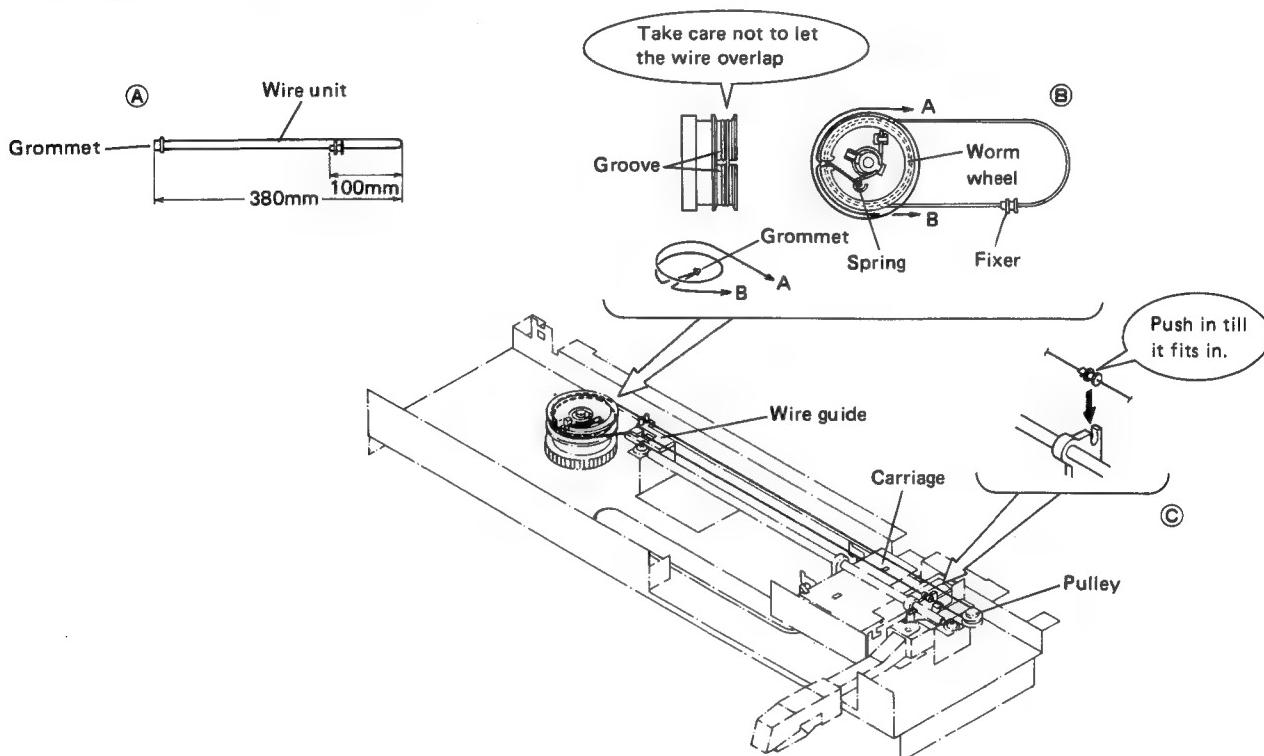


Fig. 5-4 Wire Replacement

5.4 LEAD LINE DISPOSAL

- Move the carriage to the extreme right of the slideable range.
- Fix the length of lead line ⓠ at the hole (indicated by an arrow) under the projecting metal piece.
- Move the carriage to the left and right, and check to make sure that the lead lines don't hit the carriage.

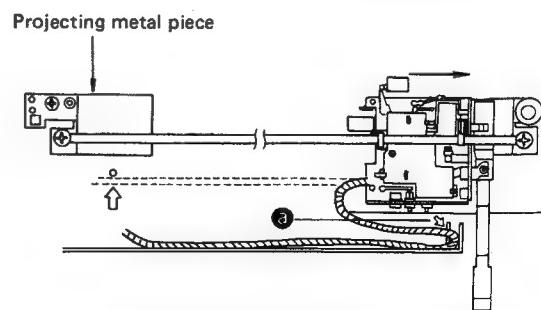


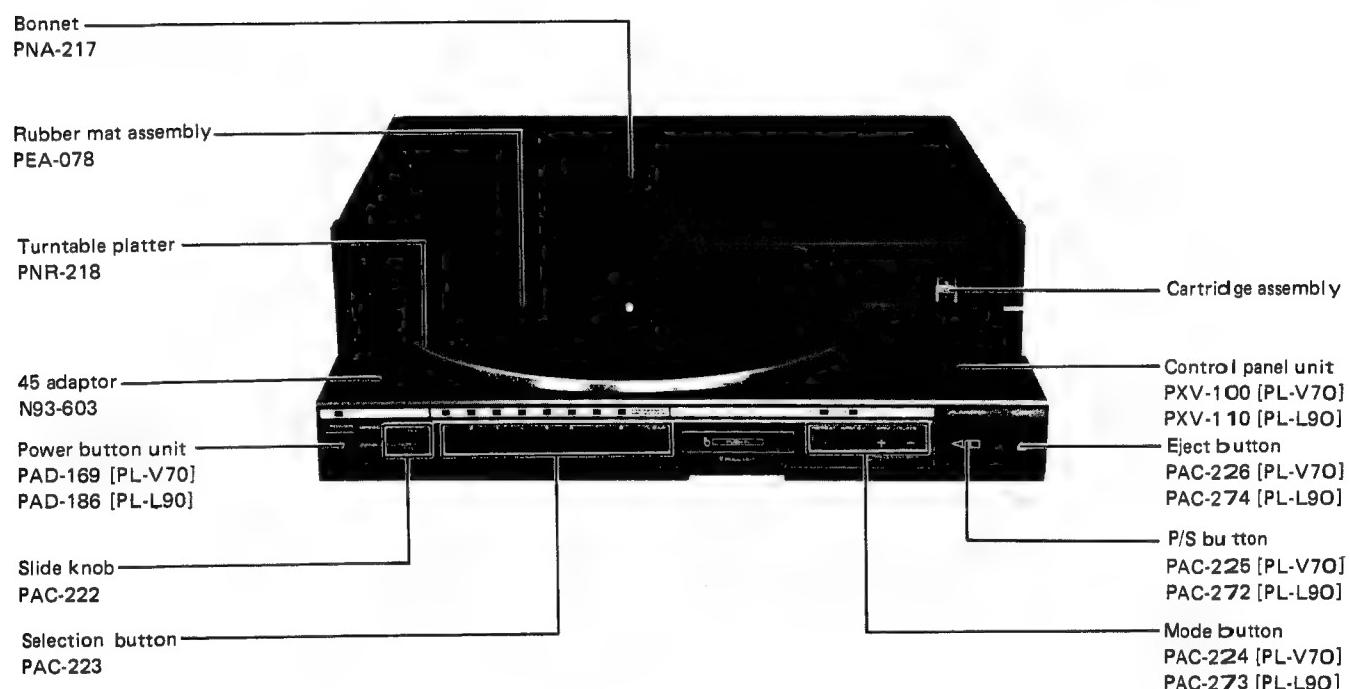
Fig. 5-5 Lead Line Disposal

6. PARTS LOCATIONS

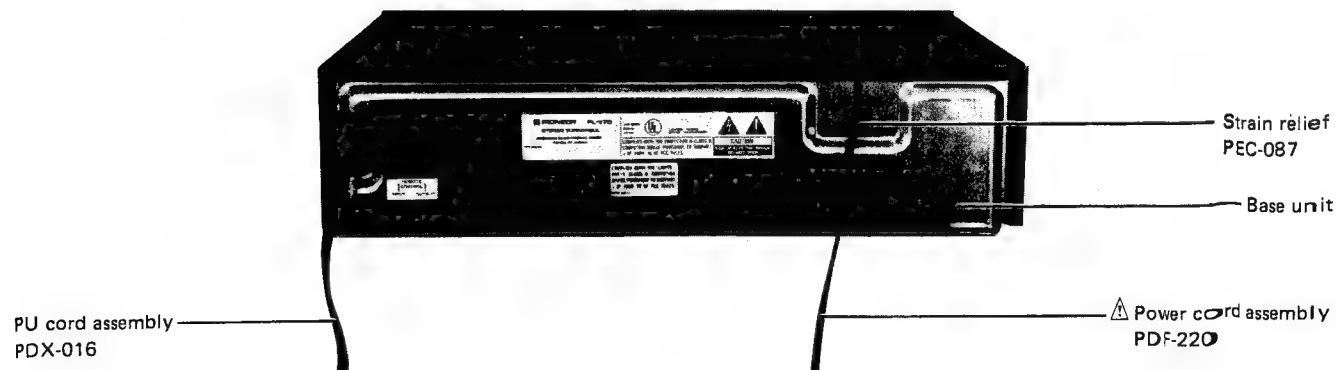
NOTES:

- The  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.
★★ GENERALLY MOVES FASTER THAN ★
This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

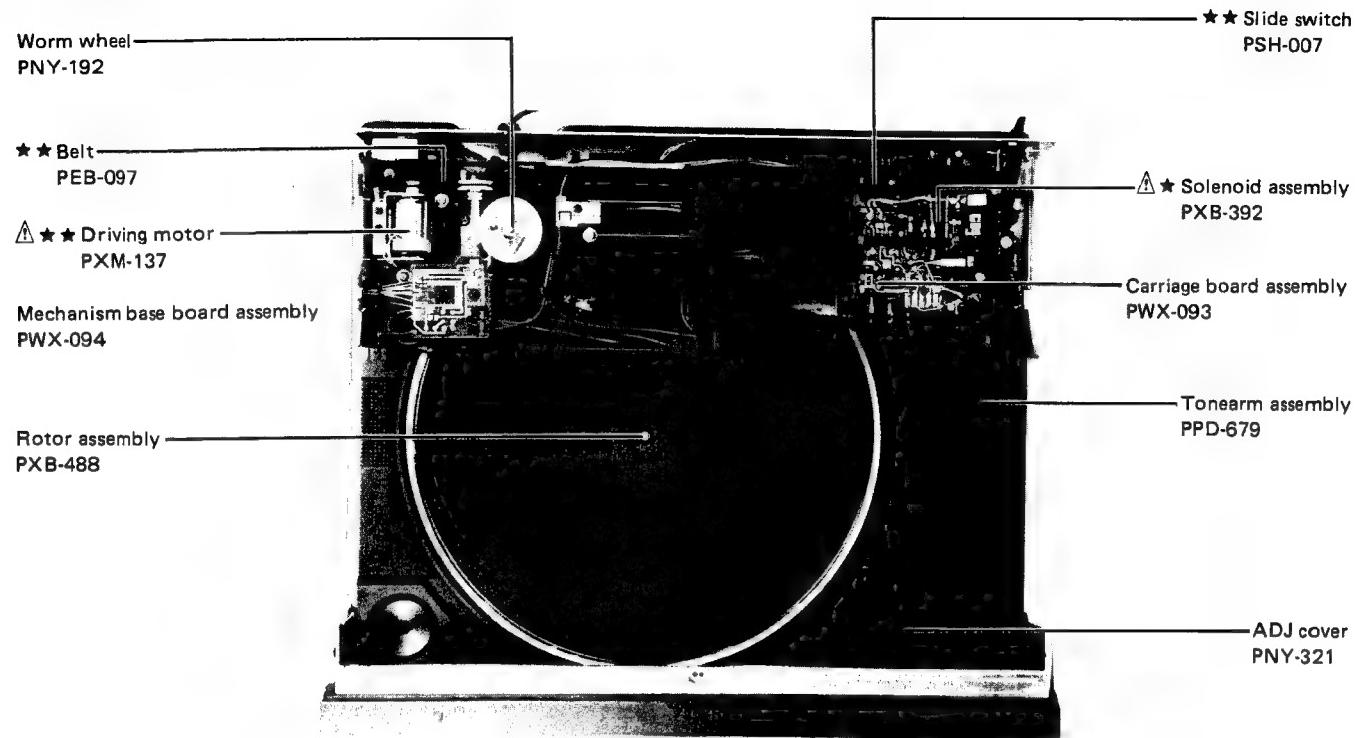
Front Panel View



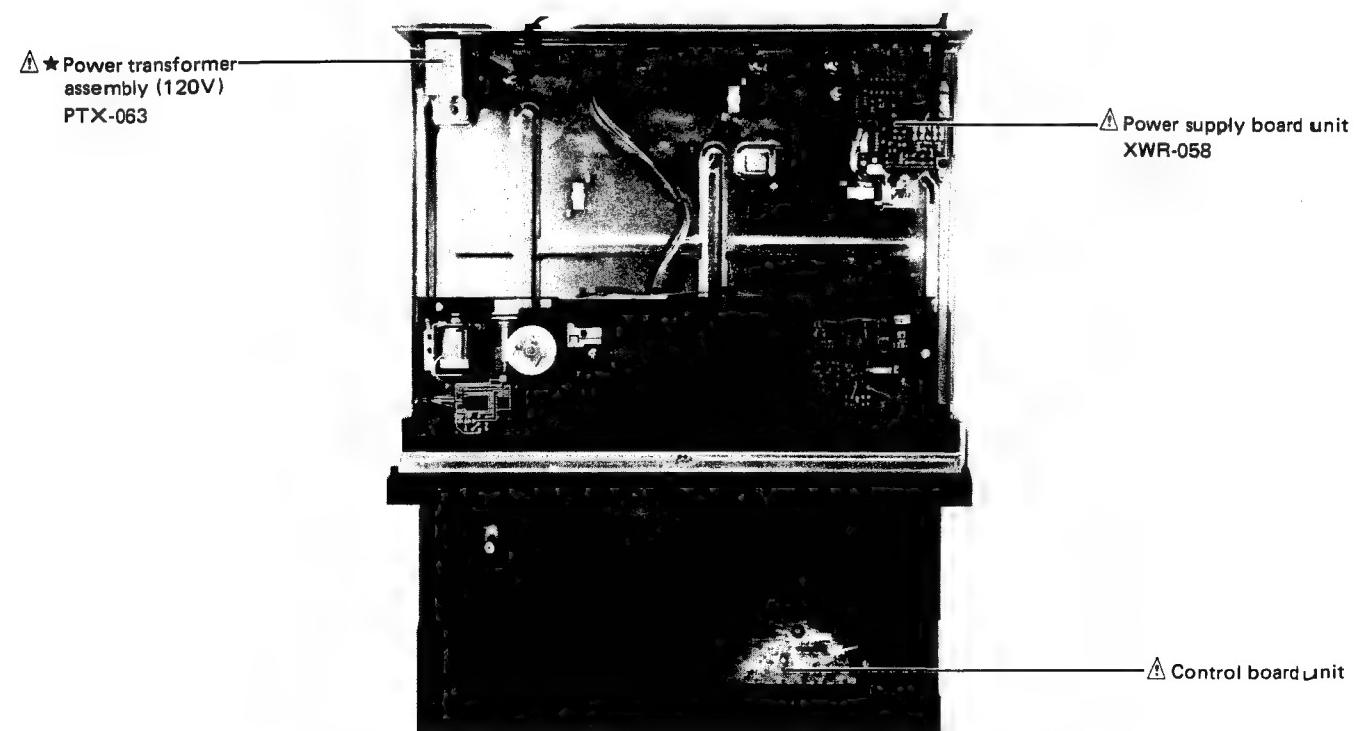
Rear Panel View



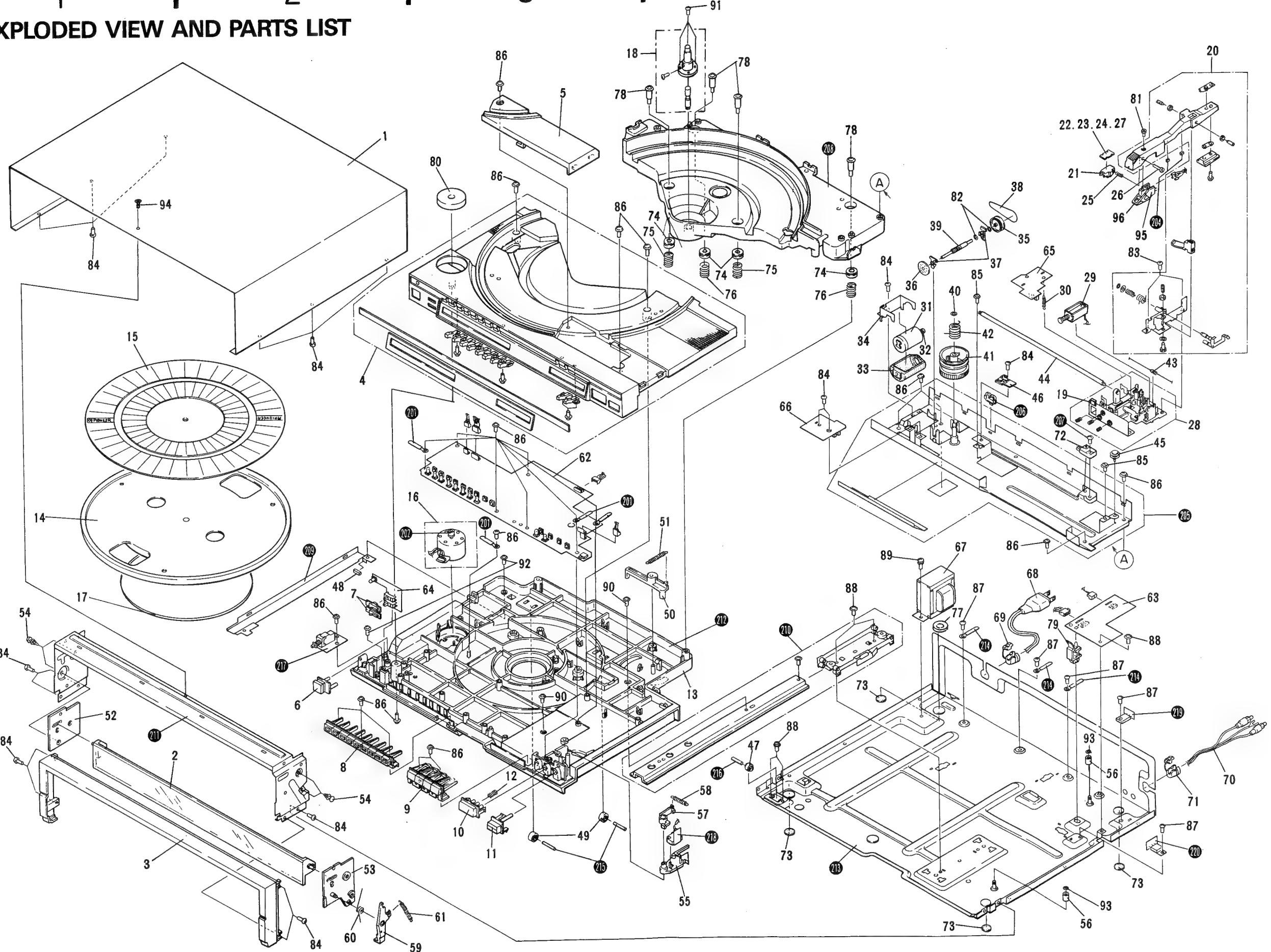
Top View 1



Top View 2



7. EXPLODED VIEW AND PARTS LIST



Parts Mark

NOTES:

- Parts without part number cannot be supplied.
- The **▲** mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your Parts Stock Control, the fast moving items are indicated with the marks **★★** and **★**.

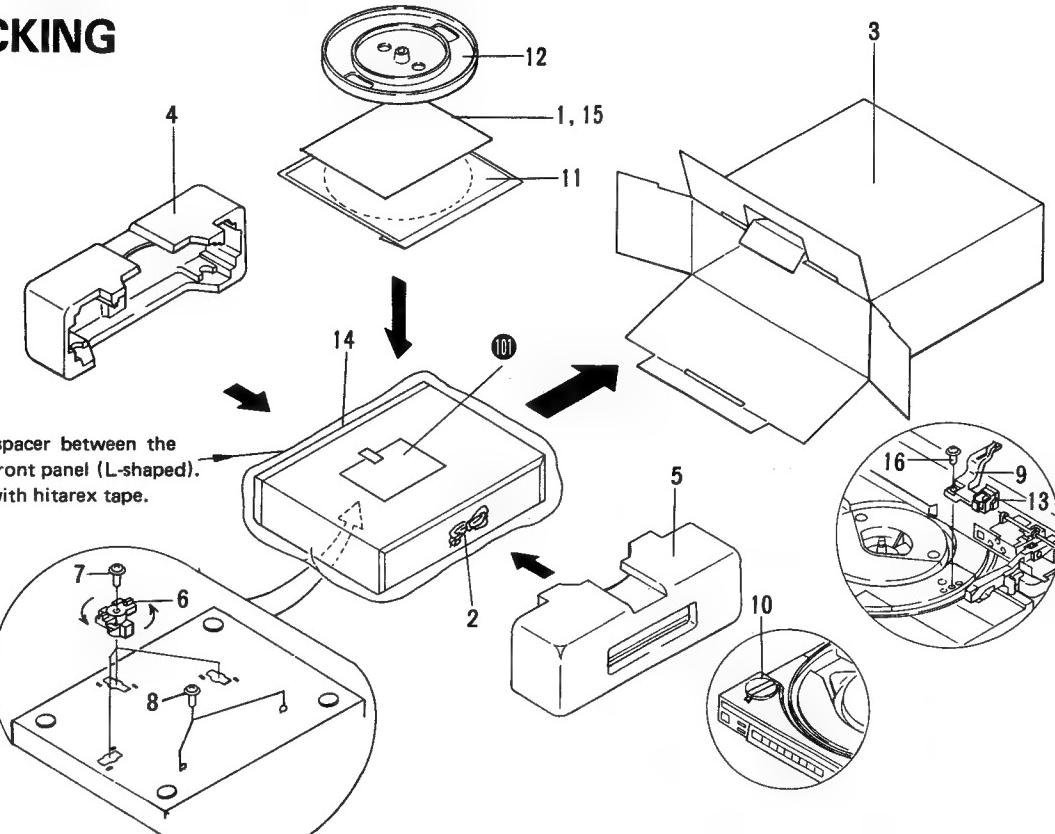
★★ GENERALLY MOVES FASTER THAN ★

This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

Parts List

Mark	No.	Part No.	Description	Mark	No.	Part No.	Description
1.	PNA-217	Bonnet		41.	PNY-192	Worm wheel	
2.	PNY-426	Front door [PL-V70]		42.	PBH-391	Tension spring	
	PNY-410	Front door [PL-L90]		43.	PLB-237	Fixer	
3.	PNY-318	Front panel		44.	PLB-259	Guide bar	
4.	PXV-100	Control panel unit [PL-V70]		45.	PXB-393	Pulley assembly	
	PXV-110	Control panel unit [PL-L90]		46.	PNY-196	Wire guide	
5.	PNY-321	ADJ cover		47.	PNY-333	Roller	
6.	PAD-169	Power button unit [PL-V70]		48.	PEC-095	Cushion	
	PAD-186	Power button unit [PL-L90]		49.	PNX-424	Roller	
7.	PAC-222	Slide knob		50.	PNY-324	Drive lever	
8.	PAC-223	Selection button		51.	PBH-413	Drive lever spring	
9.	PAC-224	Mode button [PL-V70]		52.	PNY-325	Door holder (L)	
	PAC-273	Mode button [PL-L90]		53.	PNY-326	Door holder (R)	
10.	PAC-225	P/S button [PL-V70]		54.	PBM-012	Plastic rivet	
	PAC-272	P/S button [PL-L90]		55.	PNY-327	Lock lever	
11.	PAC-226	Eject button [PL-V70]		56.	PLM-011	Roller ($\phi 3 \times \phi 6 \times /7.1$)	
	PAC-274	Eject button [PL-L90]		57.	PNY-328	Switch lever	
12.	PBH-390	Spring		58.	PBH-327	Shutter spring	
13.	PNY-312	Slide base		59.	PNY-329	Guide lever	
14.	PNR-218	Turntable platter		60.	PBH-414	Guide lever spring (A)	
15.	PEA-078	Rubber mat assembly		61.	PBH-415	Guide lever spring (B)	
★★ 16.	PYY-174	Motor assembly	▲	62.	XWM-186	Control board unit	
★★ 17.	PEB-224	Belt	▲	63.	XWR-058	Power supply board unit	
18.	PXB-488	Rotor assembly	▲	64.	XWS-040	Switch board (B) unit	
19.	PEB-298	Spacer	▲	65.	PWX-093	Carriage board assembly	
★★ 20.	PPD-679	Tonearm assembly	▲	66.	PWX-094	Mechanism base board assembly	
21.	PNY-332	Sensor case	▲	★ 67.	PTX-064	Power transformer assembly (120V)	
22.	PNP-335	Band sensor board	▲	68.	PDF-221	Power cord assembly	
★★ 23.	PCX-059	Photo transistor	▲	69.	PEC-087	Strain relief	
★ 24.	NJL1102EH	LED	▲	70.	PDX-016	PU cord assembly	
25.	PBH-424	Spring		71.	PEC-051	Strain relief	
26.	PLB-234	Adjustment screw	★ 27.	PSH-007	Slide switch		
★ 27.	PR222S-B1	LED		73.	PEC-082	Stopper	
28.	PNY-323	Carriage		74.	PEB-299	Float rubber	
★ 29.	PXB-392	Solenoid assembly		75.	PBH-416	Float spring (A)	
30.	PBH-406	Carriage spring		76.	PBH-417	Float spring (B)	
▲	★★ 31.	PXM-137	Driving motor	77.	PEC-099	Insulator	
▲	★★ 32.	PNX-498	Motor pulley	78.	PBA-144	Screw	
33.	PEB-268	Damper rubber		79.	PEC-096	Supporter	
34.	PNC-325	Motor holder		80.	N93-603	45 adaptor	
35.	PNY-190	Pulley		81.	PMZ30P060FZK	Screw	
36.	PNY-191	Slit plate		82.	WA21D040D025	Washer	
37.	PNW-391	Collar		83.	PSZ30P050FMC	Screw	
★★ 38.	PEB-097	Belt		84.	PSZ30P060FZK	Screw	
39.	PNW-485	Worm unit		85.	ISZ30P060FMC	Screw	
40.	PBF-021	Washer					

Mark	No.	Part No.	Description	Mark	No.	Part No.	Description
86.	iPC30P100FMC	Screw		206.	.....	
87.	PSZ30P060FZK	Screw		207.	Screw		
88.	iSZ30P060FZK	Screw		208.	Front base		
89.	PMA40P060FMC	Screw		209.	Roller plate		
90.	PMB30P080FMC	Screw		210.	Slide rail assembly		
91.	iPZ30P120FMC	Screw		211.	.....	
92.	iSZ30P080FMC	Screw		212.	Door angle		
93.	WT21D040D025	Washer		213.	Slide base		
94.	CMZ30P040FZK	Screw		214.	Base unit		
95.	PXV-963	Cartridge		215.	.....	
96.	PNX-981	Stylus holder		216.	Pin		
201.	.....			217.	Switch board (A) unit		
202.	.....			218.	Switch board (C) unit		
203.	.....			219.	Transistor board (A) unit		
204.	.....			220.	Transistor board (B) unit		
205.	.....					

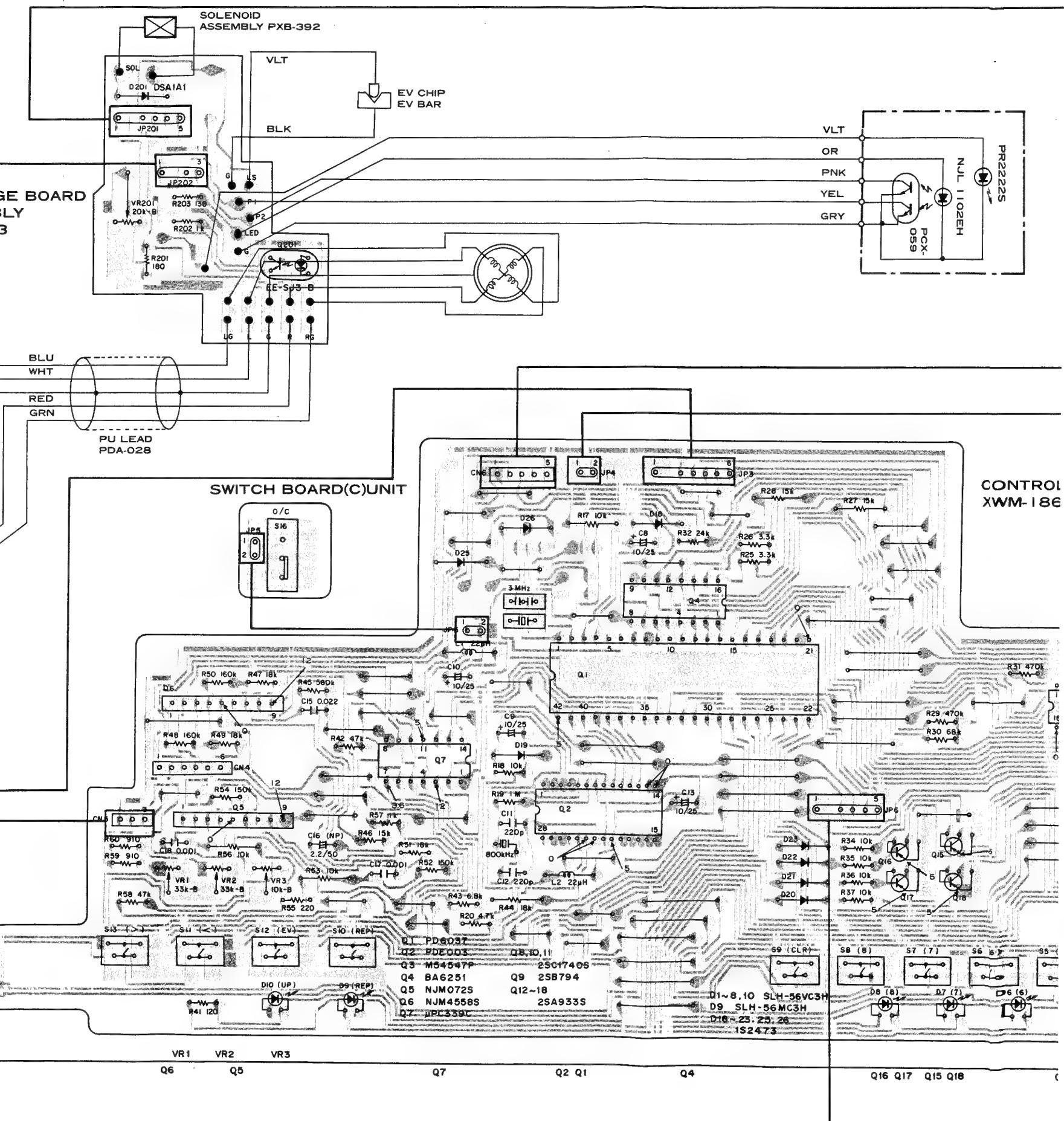
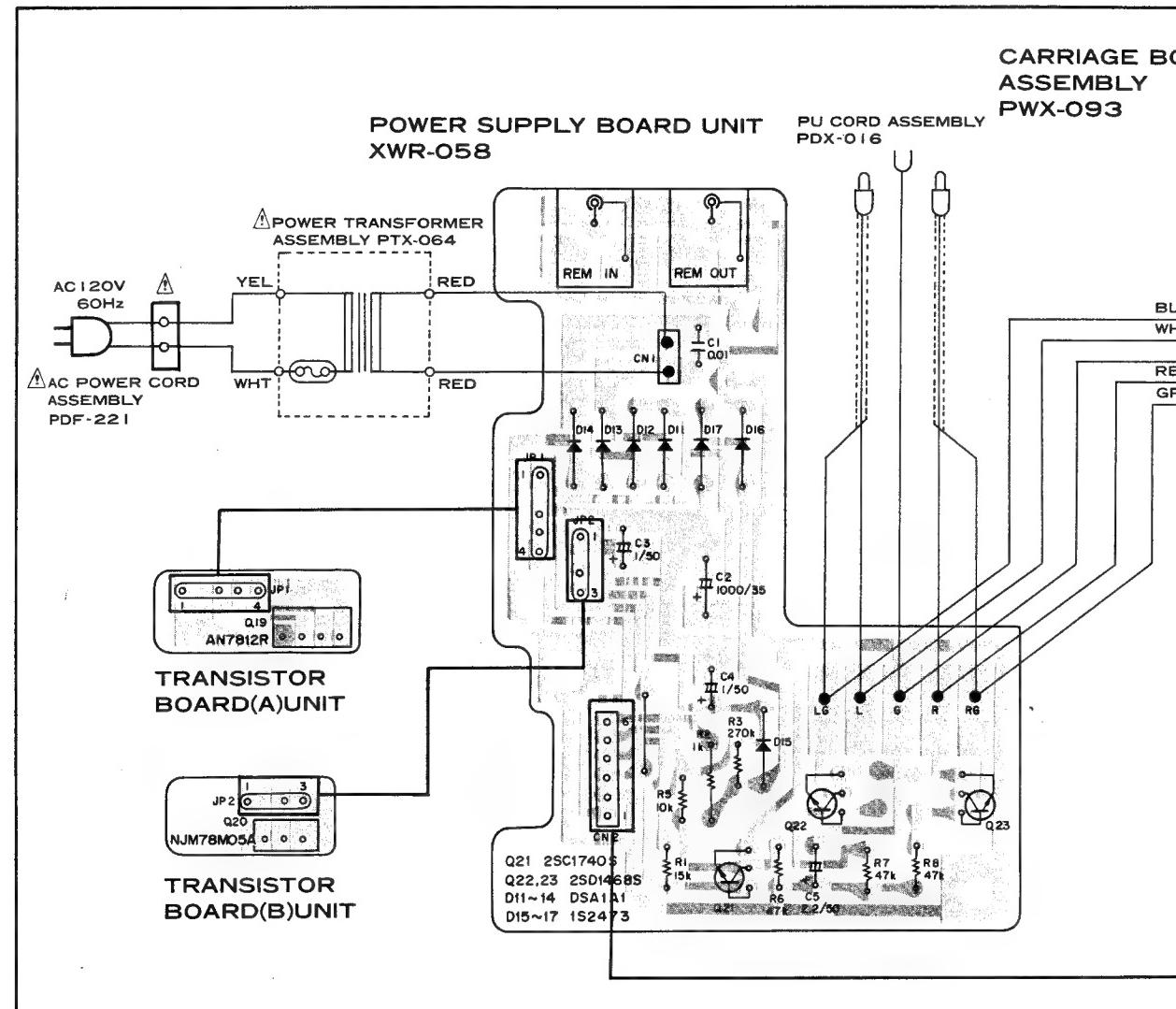
8. PACKING

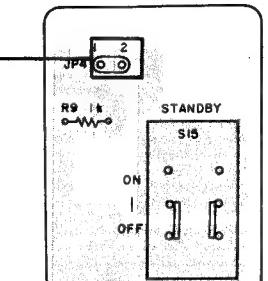
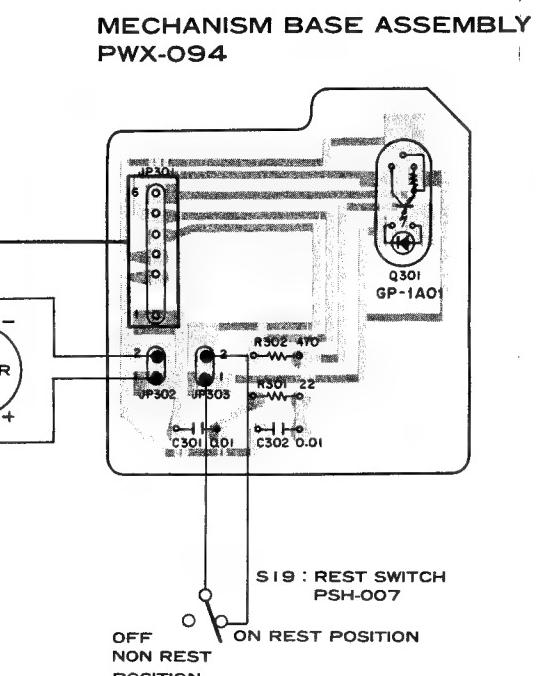
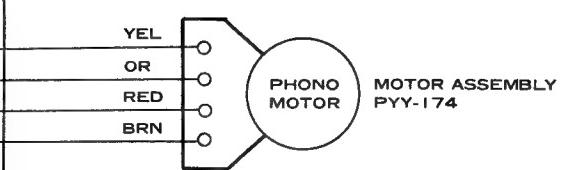
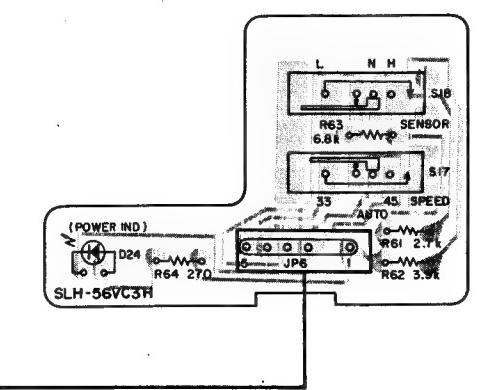
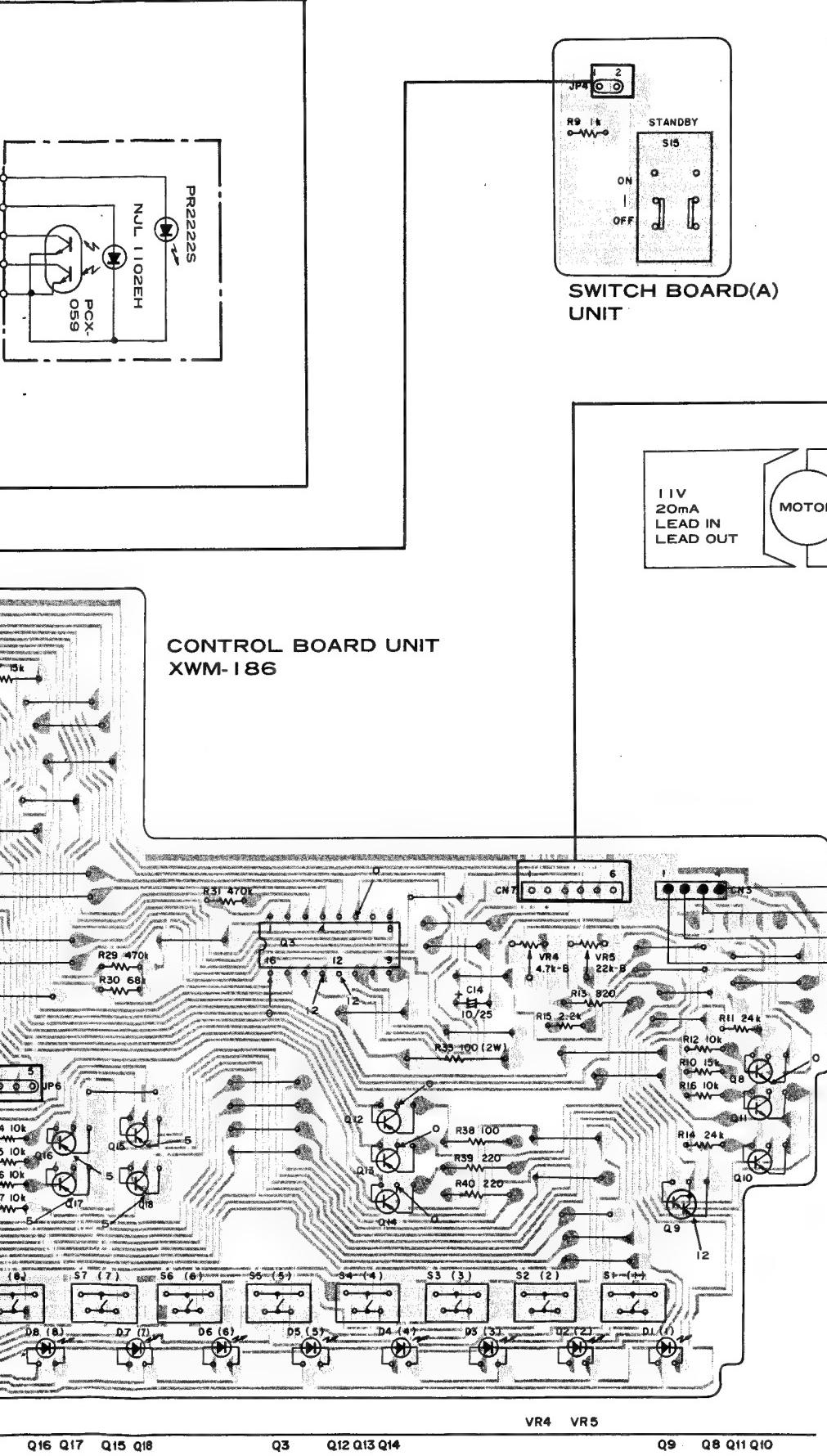
Place a door spacer between the door and the front panel (L-shaped). Fix the door with hitarex tape.

Mark	No.	Part No.	Description	Mark	No.	Part No.	Description
1.	PRB-290	Operating instructions [PL-V70]		9.	PNY-331	Carriage clamer	
2.	PRB-291	Operating instructions [PL-L90]		10.	N93-603	45 adaptor	
3.	PDE-319	PU cord		11.	PEA-078	Rubber mat assembly	
4.	PHH-257	Packing case [PL-V70]		12.	PNR-218	Turntable platter	
5.	PHH-258	Packing case [PL-L90]		13.	PHL-034	Sheet	
4.	PHA-192	Protector (F)		14.	PHC-115	Door spacer	
5.	PHA-193	Protector (R)		15.	RRG-025	Sheet [PL-V70]	
6.	PNY-330	Spacer		16.	iPZ30P120FMC	Screw	
7.	PBA-118	Screw		101.	Caution card		
8.	PBA-141	Screw					

9. P.C. BOARDS CONNECTION DIAGRAM

A





**MECHANISM BASE ASSEMBLY
PWX-094**

CONTROL BOARD UNIT
XWM-186

**SWITCH BOARD(A)
UNIT**

11V
20mA
LEAD IN
LEAD OUT

**SWITCH BOARD(B)
UNIT XWS-040**

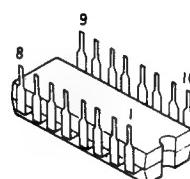
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2SC174

μ PC339C
NJM2901N

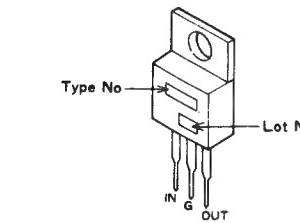
NJM072S
NJM4558S

External Appearance of Transistors and ICs

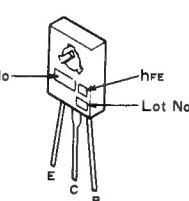
BA6251
M54547P



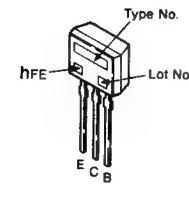
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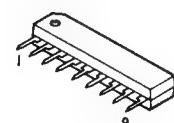
2SB794



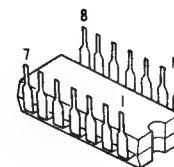
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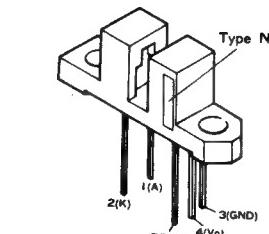
EE-SJ3-B



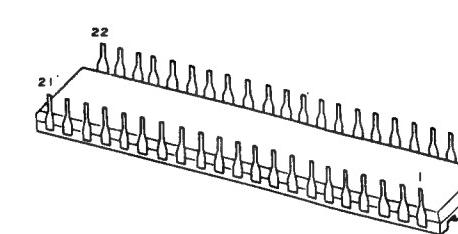
GP-1A01



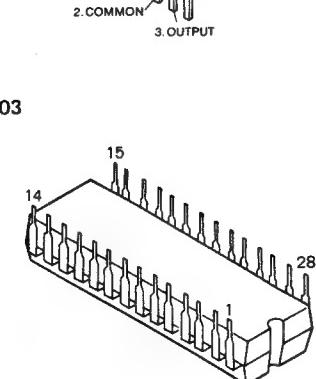
AN7812R



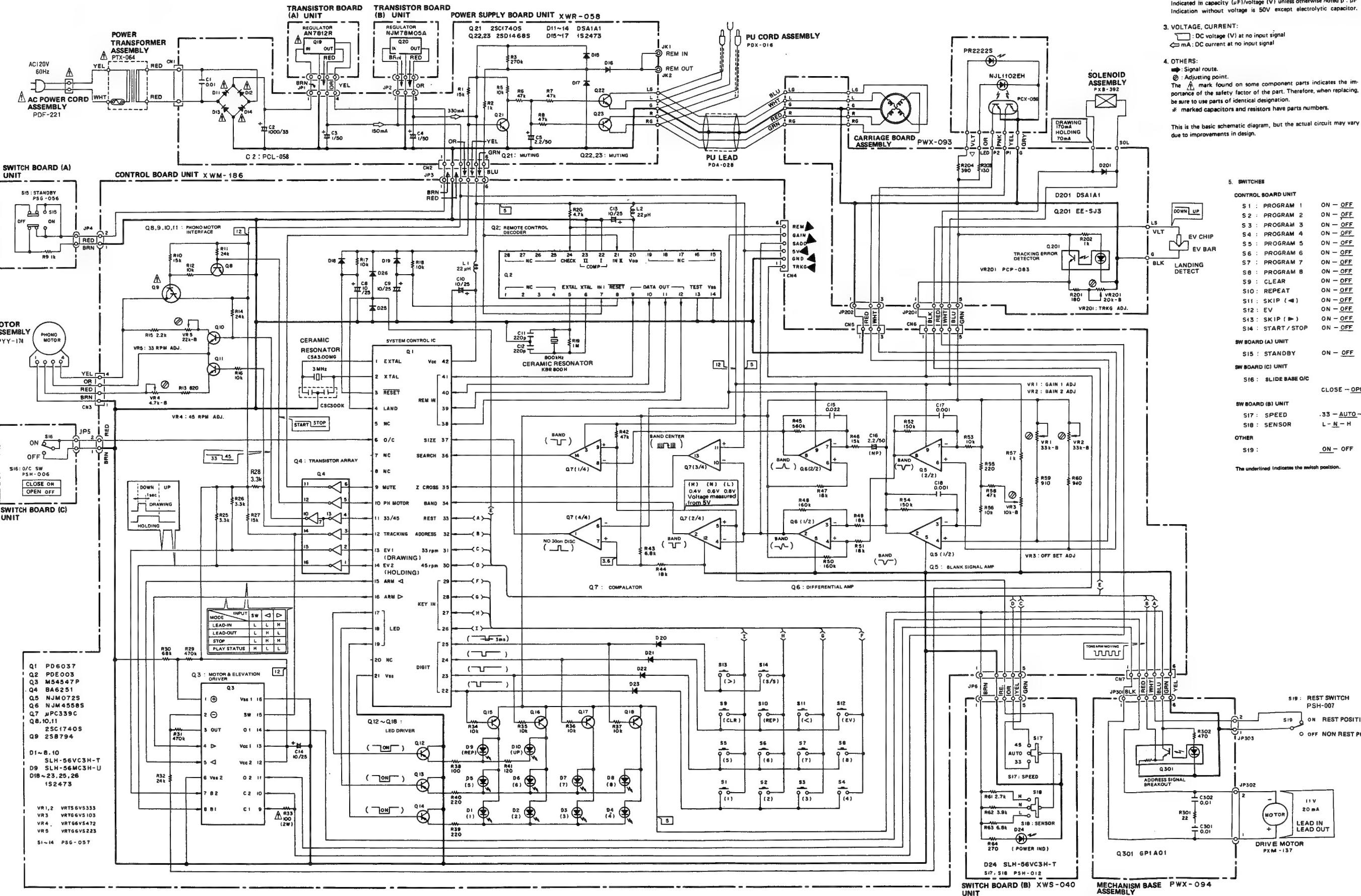
PD6037



PDE003



10. SCHEMATIC DIAGRAM



11. ELECTRICAL PARTS LIST

NOTES:

- When ordering resistors, first convert resistance values into code form as shown in the following examples.
- Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J=5%, and K=10%).
 560Ω 56 × 10¹ 561 RD%PS 561J J
 47kΩ 47 × 10³ 473 RD%PS 473K J
 0.5Ω 0R5 RN2H 0R5K K
 1Ω 010 RS1P 010K K
- Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).
 5.62kΩ 562 × 10¹ 5621 RN%SR 5621F
- The **J** mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your Parts Stock Control, the fast moving items are indicated with the marks **★★** and **★**.
- ★★ GENERALLY MOVES FASTER THAN ★**
 This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

Miscellaneous Parts

SWITCHES						
Mark	Symbol & Description	Part No.	Mark	Symbol & Description	Part No.	
▲	Control board unit	XWM-186	★★ S1 – S14	Tact switch	PSG-057	
	Power supply board unit	XWR-058				
	Switch board (A) unit		COILS			
	Switch board (B) unit	XWS-040	Mark	Symbol & Description	Part No.	
	Switch board (C) unit		L1, L2		LAL03T220K	
	Transistor board (A) unit		CAPACITORS			
	Transistor board (B) unit		Mark	Symbol & Description	Part No.	
	Carriage board assembly	PWX-093	C16	CEANP2R2M50		
	Mechanism base board assembly	PWX-094	C8 – C10	CEA100M25		
▲ ★	Power transformer assembly (120V)	PTX-064	C17	CKDVB102K50		
▲	Power cord assembly	PDF-221	C15	CKDYF223Z50		
★★	Motor assembly	PYY-174	C11, C12	CCDSL221J50		
★★	Driving motor	PXM-137	RESISTORS			
▲ ★	Solenoid assembly	PXB-392	NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.			
★★	Photo transistor	PCX-059	Mark	Symbol & Description	Part No.	
★	LED	NJL1102EH	★★ VR1, VR2	Semi-fixed 33k-B	VRTS6VS333	
★	LED	PR222S-B1	★★ VR3	Semi-fixed 10k-B	VRTG6VS103	
			★★ VR4	Semi-fixed 47k-B	VRTG6VS472	
			★★ VR5	Semi-fixed 22k-B	VRTG6VS223	
Control Board Unit (XWM-186)				R33	RS2LMF101J	
SEMICONDUCTORS				Other resistors	RD1/6PM □□□J	
Mark	Symbol & Description	Part No.				
★★ Q1		PD6037				
★★ Q2		PDE003				
★★ Q3		M54547P				
★★ Q4		BA6251				
★★ Q5		NJM072S	Control Board Unit (XWM-186)			
★★ Q6		NJM4558S	Mark	Symbol & Description	Part No.	
★★ Q7		μPC339C	★	Ceramic resonator	CSA3.00MG	
★★ Q9		2SB794	★	Ceramic resonator	CSC300K	
★★ Q12 – Q18		2SA933S	★	Ceramic resonator	KBR-800H	
★★ Q8, Q10, Q11, Q21		2SC1740S				
★ D18 – D23, D25, D26		1S2473				
★ D1 – D8, D10		SLH-56VC3H				
★ D9		SLH-56MC3H				

Power Supply Board Unit (XWR-058)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★ Q21		2SC1740S
★★ Q22, Q23		2SD1468S

⚠ ★ D11 – D14

★ D15, D16, D17

Carriage Board Assembly (PWX-093)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★ Q201		EE-SJ3-B
★ D201		DSA1A1 (1SR35-100A)

RESISTORS

NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Symbol & Description	Part No.	Mark	Symbol & Description	Part No.
C3, C4		CEA1R0M50	★ VR201	Semi-fixed 10k-B	PCP-083
C5		CEA2R2M50			
C2		PCL-058			
C1		CKDYF103Z50	R201 – R204		RD1/6PM □□□J

RESISTORS

NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Symbol & Description	Part No.
★★ Q301		GP-1A01

OTHERS

Mark	Symbol & Description	Part No.	Mark	Symbol & Description	Part No.
JK1, JK2	Terminal	RKN-071	C301, C302		CKDYF103Z50

Switch Board (A) Unit

NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Symbol & Description	Part No.
★★ S15	Switch (POWER)	PSG-056

Switch Board (B) Unit (XWS-040)

SWITCHES

Mark	Symbol & Description	Part No.
★★ S17, S18	Switch (SPEED, SENSOR)	PSH-012

Switch Board (C) Unit

NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Symbol & Description	Part No.
★★ S16	Switch (O/C)	PSH-006

Transistor Board (A) Unit

SEMICONDUCTOR

Mark	Symbol & Description	Part No.
★★ Q19		AN7812R

Transistor Board (B) Unit

SEMICONDUCTOR

Mark	Symbol & Description	Part No.
★★ Q20		NJM78M05A

12. ADJUSTMENT

12.1 STYLUS LOWERING POSITION ADJUSTMENT

- With the power ON place a test record (PLS-2001) or PLS-4001 side A up) on the turntable.
- Press the PLAY/STOP button and check the position of the tonearm as it comes to rest on the record.
- Remove the bonnet cover and turn the adjustment screw ● until the tonearm comes into line with the record.
- When the tonearm comes to rest to the right of the lead-in groove, (when the count is lower than the standard count tolerance) turn the adjustment screw ● counter-clockwise.
- When the tonearm comes to rest to the left of the lead-in groove, (when the count is higher than the standard count tolerance) turn the adjustment screw ● clockwise.
- When using the test record the position will be set for 30cm records.

Test record	Adjustment position
PLS2001	310 ± 3 counts
PLS4001	13 ± 6 counts

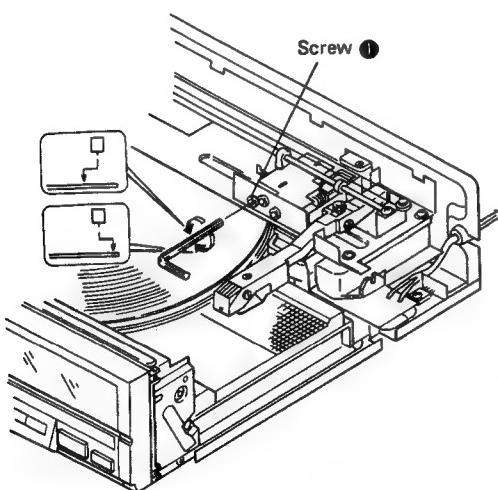


Fig. 12-1 Stylus Lowering Position Adjustment

Note:

The adjustments described in 12.1 and 12.3 can be performed without removing the bonnet cover. To do so, set S16 to ON using a spacer as described in 12.4.

12.2 TRACKING SENSOR AND OFFSET ADJUSTMENT

● Gain Adjustment

- Remove the bonnet cover and turntable platter.
- Connect a DC voltmeter to CN4 pin 2 (GND) and pin 1 (TRKG).
- Turn screw ● counterclockwise and pull the carriage unit forward.
- Turn on the power and while pushing the tone arm toward the center (as shown in the illustration) adjust VR201 (TRKG) until the DC voltmeter registers 3V ± 0.1V.

● Offset Adjustment

- Return the tonearm to the rest position. (It will return by itself when you release it.)
- To adjust it, turn screw ● clockwise until the DC voltmeter registers 1.1V ± 0.1V.

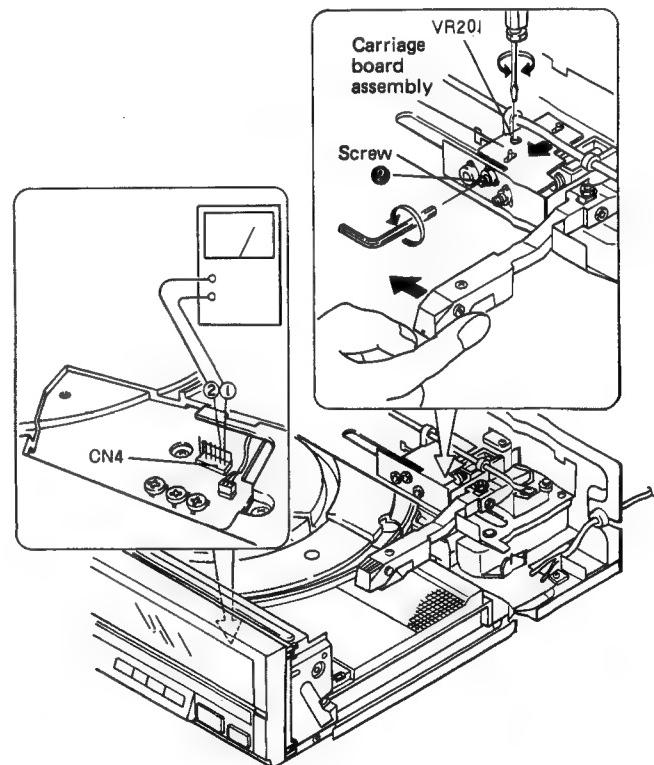


Fig. 12-2 Tracking Sensor Gain and Offset Adjustment

12.3 STYLUS HEIGHT ADJUSTMENT

1. Remove the bonnet cover.
2. Place a 30cm record on the turntable, turn on the power, and using the locate switch ($<$) move the tonearm to within approximately 100mm of the center of the turntable.
3. Turn screw ③ until the tip of the needle is 5 to 7mm above the surface of the record.
- Turning the screw clockwise lowers the needle.
- Turning the screw counterclockwise raises the needle.

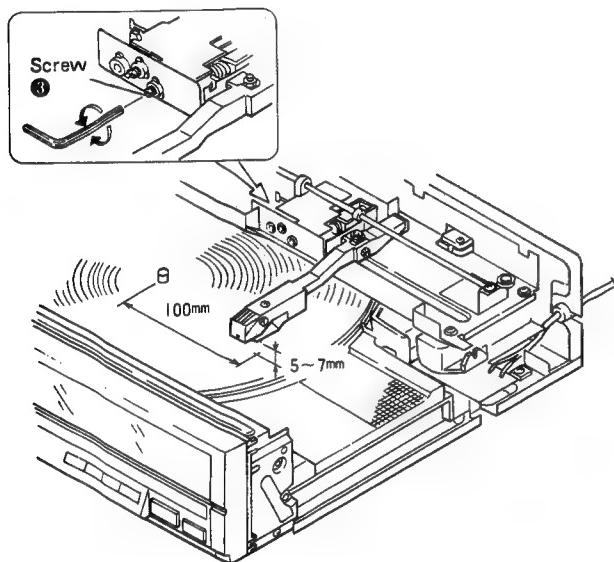


Fig. 12-3 Stylus Height Adjustment

12.4 BAND SENSOR OFFSET ADJUSTMENT

1. Turn the power off, and move the slide base to the out position. Remove the turntable and associated parts and the ADJ cover, then pull out CN5.
2. Set S16 (O/C switch) to ON by inserting a spacer (e.g., a female 8P connector) between the slide base and the lock lever beneath the slide base.
3. Turn the power on, and turn VR1 and VR2 counterclockwise (seen from the top) to the extreme left.
4. Adjust VR3 (offset) so that the voltage between pins 3 and 4 of CN4(TP) (5V – SADO) falls within 0 ± 30 mV.
5. Reconnect CN5 after adjustment is completed.

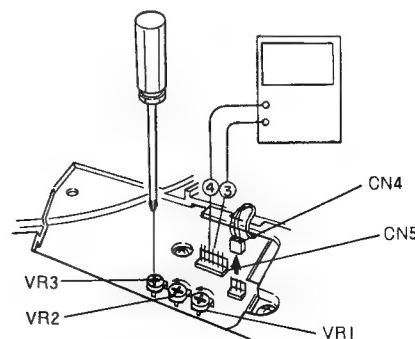
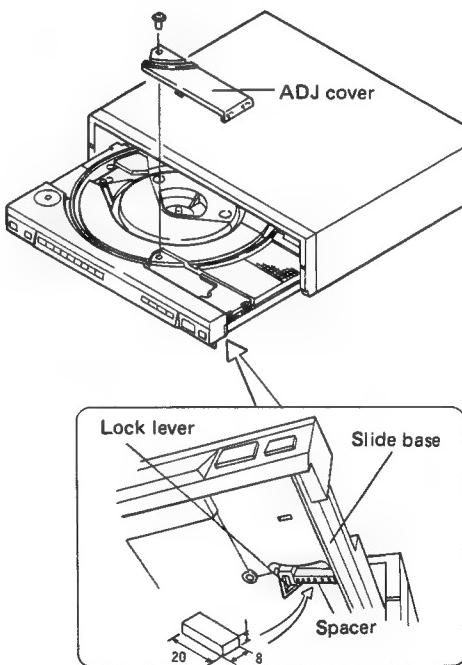


Fig. 12-4 Band Sensor Offset Adjustment

12.5 BAND SENSOR GAIN ADJUSTMENT

1. Turn off the power, plug in CN5, and connect an AC voltmeter to pins 3 (5V) and 5 (GAIN) of CN4(TP).
2. After placing test record PLS-4001 on the turntable with side B up (the grooveless side), place the notched rubber gain adjustment sheet (MLB-3199) on top of that.
3. Turn on the power and set the speed to 45 rpm. Using the locate switch ($<$), move the tonearm over the center of the slits in the notched rubber sheet as shown in figure 12-5.
4. Adjust VR1 (GAIN 1) so that the AC voltmeter reads 55 ± 3 mVAC.
5. Move the tonearm outside of the turntable using the locate switch ($>$), and remove the notched rubber sheet. Then return the tonearm to the same position as before using the locate switch ($<$).
6. Connect a DC voltmeter or oscilloscope between pin 3 (5V) and pin 4 (SADO) of CN4(TP).
7. Adjust VR2 (GAIN 2) so that the DC voltmeter or oscilloscope reads 0 ± 30 mV.

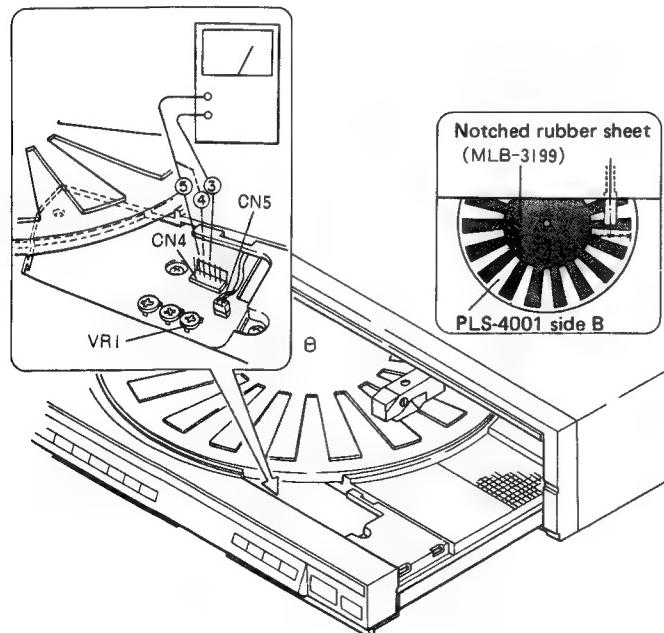


Fig. 12-5 Band Sensor Gain Adjustment

12.6 PROGRAM SELECTION ADJUSTMENT

1. Set the sensor sensitivity switch to "H", and place test record PLS-4001S side A up on the turntable.
2. Set the program switch to selection number 2 and selection number 7.
3. After the needle has come to rest in the band before selection 2, make sure that there is a 3 – 4 second 1 kHz tone. Adjust the tonearm if it doesn't come to rest within the band.
4. To adjust it, push the EV button and raise the tonearm. Turn the adjustment screw until the needle comes to rest within the band.
5. To check that adjustment is correct, bring the tonearm DOWN and press the SKIP ($>$) switch.
 - If the needle comes down in the previous selection (the 1 kHz tone is too short) turn the screw clockwise.
 - If the needle comes down in the previous selection (the 1 kHz tone is too short) turn the screw clockwise.
6. After adjusting the tonearm, push the SKIP button ($<$) and make sure that there is a 1 kHz signal before selection number 7.

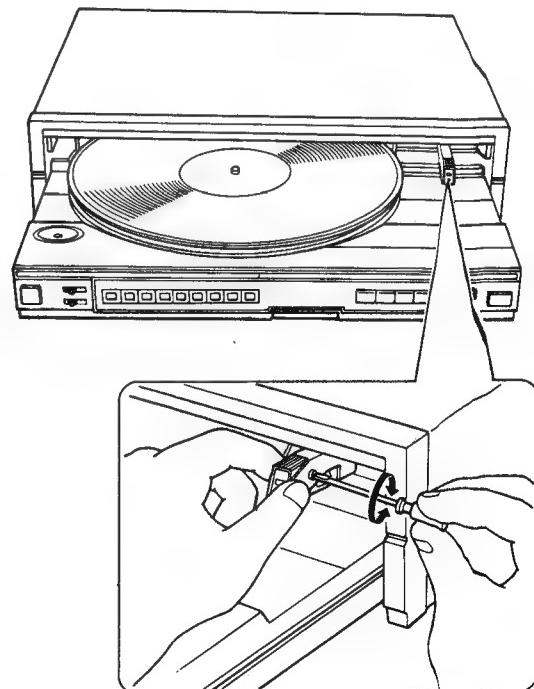


Fig. 12-6 Program Selection Adjustment

12.7 PHONO MOTOR SPEED ADJUSTMENT

1. Turn the power on with a strobo-sheet on the turntable. And turn the locate switch ($>$) on to activate the phono motor.
2. Insert a small driver from beneath the panel through the speed adjustment hole, and turn the small driver to adjust each turntable speed.

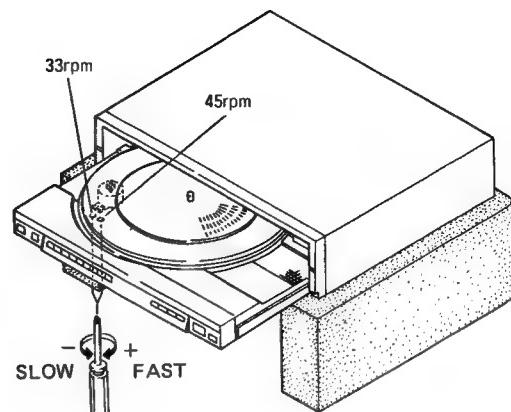


Fig. 12-7

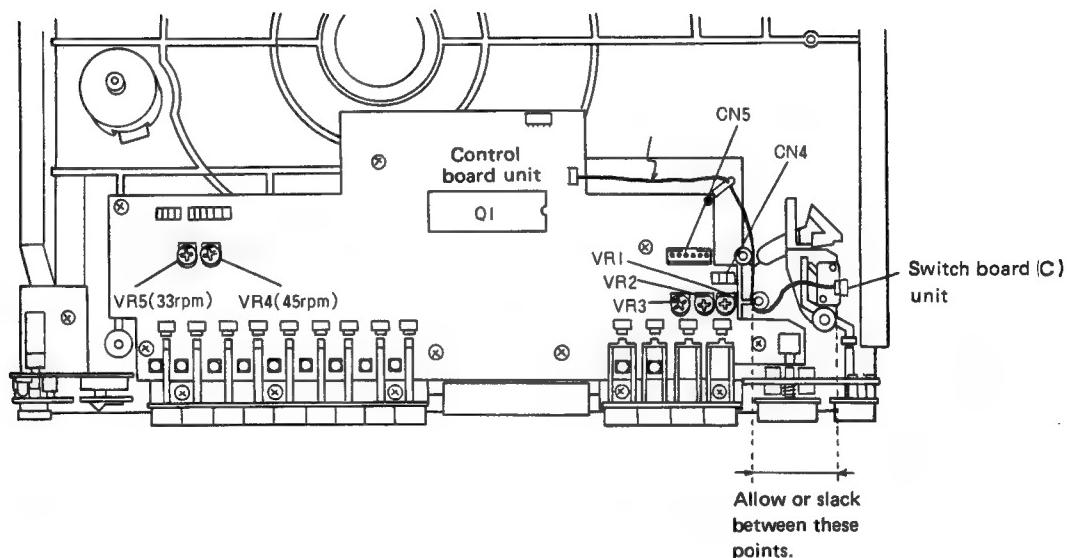
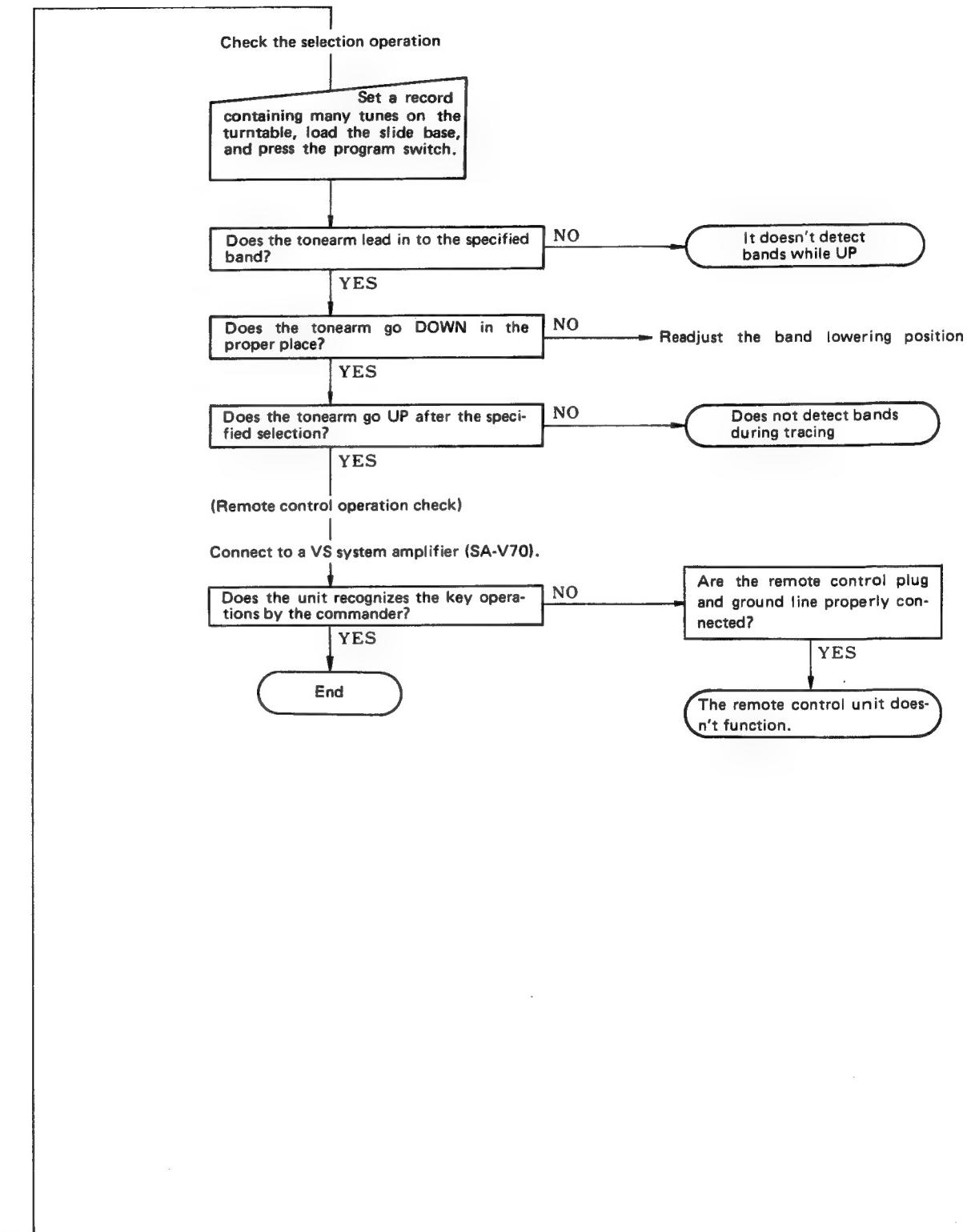
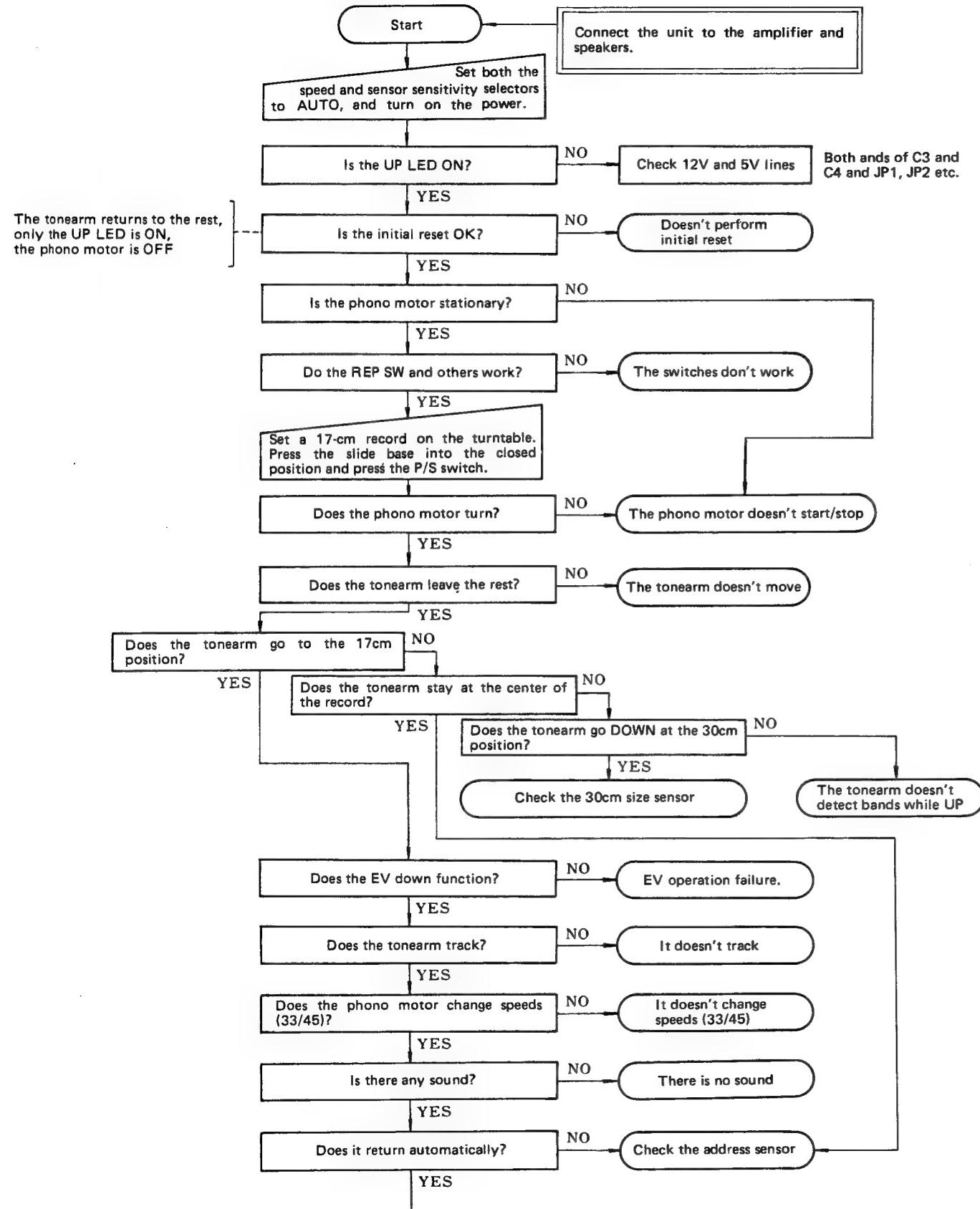
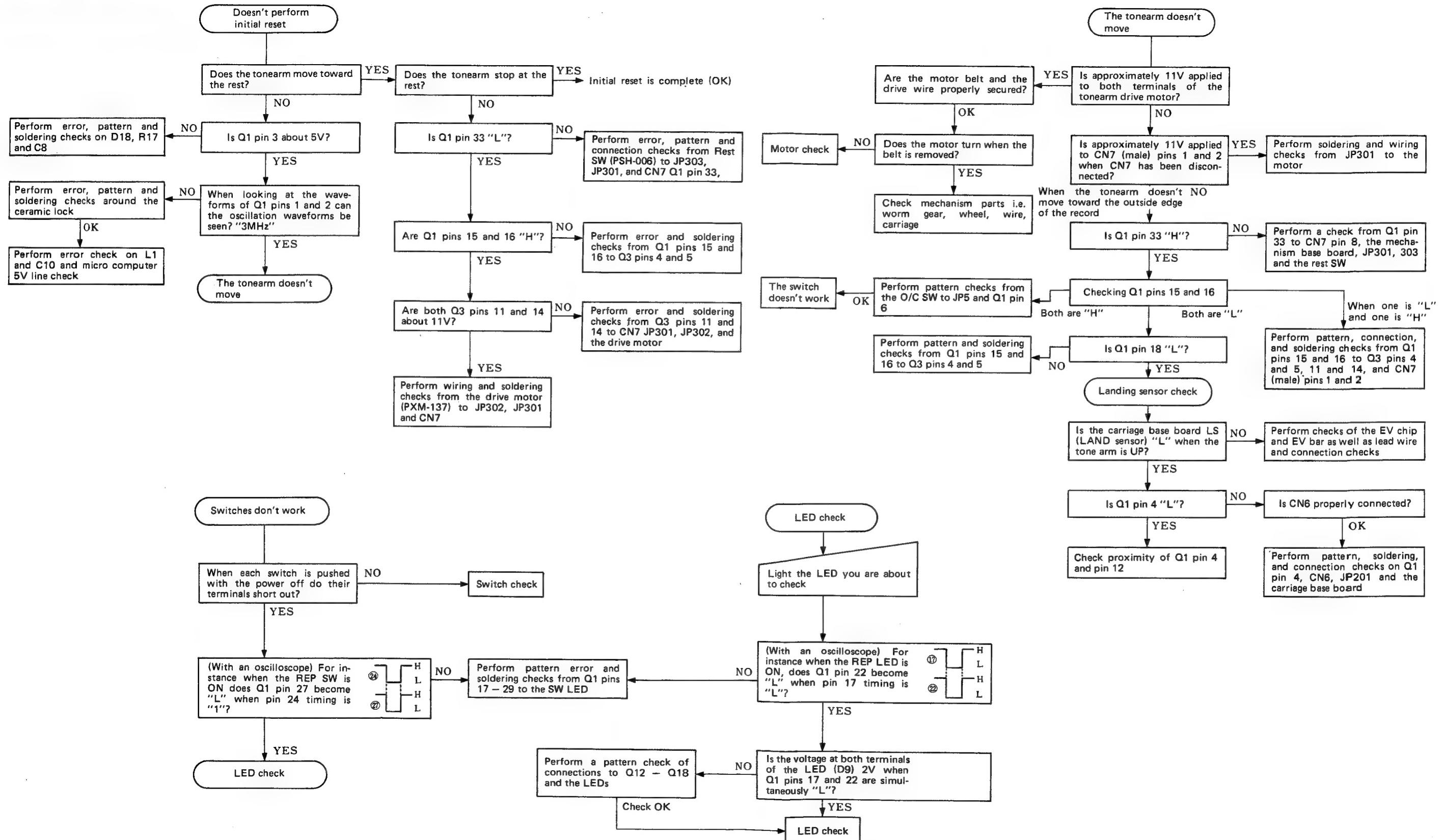


Fig. 12-8 Adjust point

13. TROUBLESHOOTING





Notes:

- The EV is up while the tonearm is on the arm rest (or while the slide base is in the out position), and will not go down in that state.
- If an operation other than "locate" occurs while the slide base is in the out position,

chances are that the lead line between the SW board (C) unit and the control board unit is tight. When attaching units such as the SW control board, therefore, allow a slack in the lead line. (See figure 12-8 on page 52)

